DATED: 19.11.2026

RAMAN RESEARCH INSTITUTE

C.V. Raman Avenue, Sadashivanagar, Bengaluru - 560080

Supply, Installation, Testing and Commissioning (SITC) of Air Handling Units (AHUs) with VRF/VRV System including all Allied HVAC works suitable for class 100000 clean room conditions for LASE Lab at RRI Campus, Bengaluru

Item Rate Tender & Contract for works

NIT No: RRI/E&B/HVAC/PT-19/2026-27, Dated: 17.11.2026

TENDER DOCUMENT - TECHNICAL BID

RAMAN RESEARCH INSTITUTE

C.V. Raman Avenue, Sadashivanagar, Bengaluru – 560080

NAME OF THE WORK: **Supply, Installation, Testing and Commissioning (SITC) of Air Handling Units (AHUs) with VRF/VRV System including all Allied HVAC works suitable for class 100000 clean room conditions for LASE Lab at RRI Campus, Bengaluru**

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RAMAN RESEARCH INSTITUTE, BENGALURU

GOVERNMENT OF INDIA

NOTICE INVITING TENDER

Date: 19.11.2026

Tender Notice No. **NIT No: RRI/E&B/HVAC/PT-19/2026-27, Dtd: 17.11.2026**

1. On Behalf of the Director, Raman Research Institute, sealed, item-rate tenders are invited for the following work.

Sl. No	Description	Details
1.	Title of work	Supply, Installation, Testing and Commissioning (SITC) of Air Handling Units (AHUs) with VRF/VRV System including all Allied HVAC works suitable for class 100000 clean room conditions for LASE Lab at RRI Campus, Bengaluru
2.	Estimated cost put to tender	**RS. 1.20 Crores** inclusive of prevailing GST
3.	Period of completion in months reckoned from the date of issue of work order.	75 days
4.	Cost of tender document	Rs.590/- inclusive of GST
5.	Period during which the request for tender document can be obtained.	19/11/2026 to 10/12/2026
6.	Last date and time for receiptof tenders.	10/12/2026 Upto 4.00PM
7.	Due date and time of openingof tenders.	11/12/2026 at 4.00PM
8.	Earnest money deposit (EMD)	Rs. 2,40,000/-

2. Eligibility Criteria for Issue of Tender Documents:

Tender documents will be issued only to those who satisfy the following eligibility criteria:

Sl. No	Eligibility Criteria	Documentary proof for the eligibility (Self attested copies to be submitted)
a.	Should have satisfactorily completed the works as mentioned below during the last Seven years. i. Three similar works each costing not less than Rs. 48.00 Lakhs **(or)** ii. Two similar works each costing not less than Rs. 72.00 Lakhs **(or)** iii. One similar work costing not less than Rs. 96.00 Lakhs**.**	i. Certified copy of Work Completion certificates along with work orders issued by the authority concerned to establishwork experience. ii. Completion certificates for works issued by Private parties shall be supported by TDS (Tax Deducted at Source) certificates.
	Note: i. Similar work shall mean Supply, Installation, Testing and Commissioning (SITC) of Air Handling Units (AHUs) with VRF/VRV/Chilled water System including all Allied HVAC works	
	ii. The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum, calculated from the date of completion to last date of receipt of application for bids.	
b.	Should have had average annual financial turnover not less than Rs. 36.00 Lakhs of the work during the last three years ending 31st March of preceding year (2026).	Certified copy from charted Accountant for the Annual financial turnover and balance sheet showing Profit & Loss.
c.	Should not have incurred any loss in morethan two years during the last five years ending 31st March, 2026.	
d.	Should have a solvency of Rs. 48.00 Lakhs of the work	Certified copy of a current Solvency Certificate issued by any Scheduled Bank for the current FY (2026-27).

3. Issue of tender documents on the basis of the documentary eligibility alone will not make a tenderer eligible for participating in the bidding. The documents furnished by the tenderers will be subjected to verification subsequently by Institute. If found not meeting the requirement, such offers will be rejected.

4. On request in writing, with requisite fee in the form of Demand Draft/ UPI transaction and eligibility documents specified above, tender documents along with all required documents can be **download the soft copy from Central Public Procurement Portal (CPPP)/RRI website also & document fee in the form of Demand Draft to the address of RRI shall be submitted along with the technical bid.**

5. Tenders should be accompanied with Earnest Money Deposit for value specified in Para 1 above under sl.no.8, in the form of Deposit at Call receipt/ Term Deposit Receipt of any Scheduled Bank issued in favor of The Director, RRI (or) in the form of Bank guarantee issued by a scheduled bank. Earnest Money Deposit shall be valid for **120 days** from the due date of receipt of tenders.

6. The MSME units claiming exemption of EMD should submit MSME UDYOG AADHAAR MEMORANDUM or registration certificate issued by District Industries Centre (DIC) / Khadi & Industries board (KVIB) / Coir board / National Small Industries Corporation (NSIC) / Directorate of Handicrafts and handlooms or any other body specified by Ministry of MSME. The memorandum / certificate shall be valid as on due date / extended due date of the tender.

7. The MSME units claiming exemption of EMD should submit attested hard copy of MSME UDYOG AADHAAR MEMORANDUM in relevant field or registration certificate as indicated in Para 6 above. If hardcopy is not received on or before due date and time of opening of the tender, the tender offer shall be summarily rejected.

8. Tenders should be submitted in three sealed cloths lined covers as below,

Cover i. Containing Technical Bid - This cover shall be super-scribed as "Technical Bid' and also the name of the work, NIT number and name of Tenderer. This cover should contain the full set of tender documents issued to the Tenderer (except the price bid - which should be in Cover ii), duly filled in and signed. In case the Tenderer intends any observation / comments / remarks on Institutional conditions and specifications, the same shall be brought out in the technical bid or else a confirmation that the Tenderer agrees to the terms

and conditions and specifications of the tender 'in Toto' shall be enclosed. **Earnest money Deposit** in the prescribed form should accompany the Technical Bid Envelope. The Tenders without requisite EMD with full validity as specified in Para (5) above will be summarily rejected.

Cover ii. Containing Price Bid - This cover shall be super-scribed as 'Price Bid' and also the name of the work, NIT number and name of Tenderer. The Tenderers shall quote the rates in figures as well as in words tendered by them. All corrections shall be attested by the date and initials of the Tenderer. The rates shall be filled only on the price bid format furnished along with the tender document. Any conditions in the price bid will make the price bid invalid and liable for rejection.

Both the covers (Cover i & Cover ii) mentioned above shall be put in another sealed cloth lined cover i.e., Cover-iii, super-scribing the name of work, NIT number and Name of Tenderer. Tenders submitted in any other manner will be rejected.

Price bid shall not be put in the technical bid, in which case the entire tender is liable to be rejected.

9. Price shall be quoted only on the price schedule / bill of quantities forming part of the tender documents issued by Institute and returned in original in *cover (iii)* specified in Para 8 above.

10. The tender accepting authority on behalf of The Director, RRI is not bound to accept the lowest or any other tender and reserves the authority to reject any or all the tenders received without assigning any reason. All tenders in which any of the prescribed condition is not fulfilled or any condition including that of conditional rebate is put forth by the tenderer shall be summarily rejected.

11. Tenderers shall sign all the pages of Technical & Commercial bid and Price bid without fail. The tender documents, duly filled in at required pages, along with drawings should be returned along with the tender**.** (If required, tenderers can obtain an additional set of tender documents for reference on payment as mentioned in Para 1).

12. Tenders will be received and opened at Estate Office, Raman Research Institute on the stipulated date and time specified in Para 1 above. Delayed and late tenders will be summarily rejected.

Tenders will be opened in the presence of attending tenderers or their authorized representatives.

13. On the due date of opening, the ***Cover-iii*** will be opened initially. Subsequently, on the same day ***Cover-i***, i.e., technical bid, of those tenderers who have furnished valid EMD and requisite documents only will be opened. On opening of ***Cover-i***, i.e., technical bid, further detailed scrutiny/evaluation will be carried out. During the evaluation of technical bids, the documents furnished by the tenderers will be scrutinized in detail. Any tender, found as not fulfilling the eligibility criteria will be rejected at this stage and such offers will not be considered for further processing. The tenders shall further evaluate based on the documents furnished and made qualified for further processing of the tenders. If required, their completed works will be inspected. The ***Cover-ii,*** i.e., price bids of only those tenderers who have been qualified during the scrutiny and technical evaluation will be opened separately on a specified date (with due intimation to the qualified bidders) and further processed, as per tender procedure/ stipulations.

14. The Tenderer, whose offer is accepted, will be required to furnish **performance guarantee of 5% (Five Percent)** of the Work Order value within 15 days from the date of issue of letter of intent/ work order. This guarantee shall be in the form of Deposit at Call receipt/ Term Deposit Receipt of any Scheduled Bank issued in favor of Director, RRI (or) in the form of Bank guarantee issued by a scheduled bank in accordance with the prescribed form. In case the contractor fails to deposit the said performance guarantee within the period specified including the extended period if any, the Earnest Money deposited by the contractor will be forfeited and letter of intent/ work order cancelled automatically without any notice to the contractor. The Earnest Money deposited along with tender shall be refunded only after receiving the aforesaid performance guarantee.

15. **Security Deposit**: The contractor, immediately on completion of the work, has to furnish a security deposit of 5% (Five Percent) of the **'Work Order Value'** of work in the form of bank guarantee from a scheduled bank in the prescribed form. The bank guarantee shall be valid for the entire defect liability period/Warranty period plus six months claim period. In the event of contractor failing to furnish the security deposit on completion of the work, the performance guarantee already submitted will be converted into security deposit. The bidder is expected to comply with relevant labour laws while executing the work.

16. The refund of EMD of unsuccessful tenderers will be made through cheque/electronic mode, within a month after the expiration of our bid validity period or any extension to it.

17. Intending tenderers may inspect the site before submitting the tenders, with theprior permission of Estates & Buildings Department, RRI. Interested tenderers may reach the Estate Office on Email: estate@rri.res.in

18. If the tenderer fails to complete the work in specified period 0f **75 days** as specified in NIT under para no.1. The tenderer is liable to pay compensation for delay of work at the rate of 1% per every week of delay for the incomplete works (which will be levied). The Institute reserves the right not to accept the work in part or full. Exceptions: Force Majeure.

19. The tender accepting authority on behalf of The Director, RRI is not bound to acceptthe lowest or any other tender and reserves the authority to reject any or all the tenders received without assigning any reason. All tenders in which any of the prescribed condition is not fulfilled or any condition including that of conditional rebate is put forth by the tenderer shall be summarily rejected.

20. Additions and Alterations in the work: The Bill of quantities indicate approximate estimated quantities. If at any time after acceptance of the tender, Engineer-in-charge shall decide to abandon or reduce the scope of the works for any reason whatsoever and hence not require the whole or any part of the works to be carried out, the Engineer-in-charge shall give notice in writing to that effect to the contractor and the contractor shall act accordingly in the matter. The contractor shall have no claim to any payment of compensation or otherwise whatsoever.

21. The Tenderer has no right to suggest alternate terms and Conditions.

22. The tender accepting authority on behalf of T h e Director, RRI also reserves the right to alter the scope/ or reduce quantum of work before issue of work order and the tenderer shall not have any claim what so ever on this account.

23. The tender accepting authority on behalf of Director, RRI reserves the right of accepting the whole or any part of the tender and the tenderer shall be bound to perform the same at the rate quoted.

24. Canvassing directly or indirectly, in connection with tender is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable for rejection.

25. The tender accepting authority reserves the option to give preferences to the offers in accordance with the policies of the Government from time to time.

26. The tenderer shall not be permitted to tender for works in the Institute

responsible for award and execution of contracts for which his/her near relative is working. He/she shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and who are near relatives to any Gazetted Officer in the Institute. Any breach of this condition by the contractor would render him liable for rejection of tender or cancellation of contract.

27. On award of work, the contractor shall not be permitted to sub-contract any portion of work, in full or even part, without the prior written consent by the Institute.

28. The tender should be valid for **minimum period of 120 days** from the due date of receipt of the tender specified in Para 1 above. If any tenderer withdraws the offer within the validity period or makes any modifications in the terms and conditions of the tender which are not acceptable to the Institute, the Institute shall without prejudice to any other right or remedy, be at liberty to forfeit 50% (Fifty Percent) of the Earnest Money Deposit absolutely. Further, the tenderer shall not beallowed to participate in the re-tendering process of the work.

29. On concluding the tender, an agreement shall be drawn with the successful tenderer on a stamp paper of Rs.500/-.

Administrative Officer
RAMAN RESEARCH INSTITUTE, BENGALUR

OTHER TERMS AND CONDITIONS:

1. All the pages of tender document to be signed by the bidder and submit.

2. The tenders shall be complete in all respects and the details specified in this request shall be adhered to before submission. Otherwise, tenders are liable to be rejected.

3. Tenders shall be valid for **120** days from the date of acceptance of tender. Bid submitted for a shorter period will be rejected.

4. Unit price should be mentioned legibly and cle-rly. Taxes should be indicated separately.

5. Each of these tenders should be sealed in a separate envelope and bear the reference number and due date of this enquiry and indicate their contents: as technical bid or price bid. These sealed tenders shall be enclosed in an outer cover as brought out in para no.08 of NIT.

6. The Institute reserves the right to modify the technical specification or the required quantity at any time but within one week before the due date and will be duly notified on the website. After awarding the work, the final work order quantity may be lower or higher than that mentioned in the tender.

7. The Institute reserves the right to postpone/extend the due date for submission/opening date of the tender without assigning any reason.

8. The bidders shall have proven record of executing a similar work and provide a list of their clients with their official contacts from whom the Institute could if so desires, contact for referee reports.

9. The Financial Bids will be opened only for those technical bids which are found qualified and approved by our technical personnel.

10. The Institute reserves the right to reject any or all of the tenders received without assigning any reason. It also reserves the right to accept an offer other than the lowest.

11. The Institute reserves the right to call potential bidders for technical discussions and product demonstrations.

12. Any inputs received from any experts for evaluation of the technical bids received assuring confidentiality will be made available to only those who are involved in decision-making. The final decision arrived by the Institute will be announced on its website.

13. The opening of the financial bid based on the technical evaluation after satisfying with the clarifications sought if any, and such financial bid/s will

be opened on informing bidder/s in due course in their presence.

14. Any Technical clarification required towards submission of offer may please be mailed to estate@rri.res.in

15. In the event no rate has been quoted for any item / items, leaving space both in figure(s), word(s) and amount blank, it will be presumed that the contractor has included the cost of this / these item(s) in other items and rate for such item(s) will be considered as zero and will be required to execute the work accordingly.

16. Rates quoted by the Contractor in item rate tender in figures and words shall be accurately filled in so that there is no discrepancy in the rates written in figures and words. However, if any discrepancy is found, the rates which correspond with the amount worked out by the Contractor shall be taken as correct.

17. The acceptance or rejection of the bids shall vest with RRI, Bengaluru, India. RRI also reserves the right to reject any or all tenders in part or in full without assigning any reasons thereof.

18. Even though the bidders may meet the qualifying criteria, they are subject to be disqualified if they have made misleading or false representations in the forms, statements and attachments submitted in proof of the eligibility requirements.

19. A self-declaration towards not having record of poor performance such as abandoning the works / not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc., has to be provided.

20. The Bidder along with his team, at the Bidder's own responsibility and risk is encouraged to visit and examine the Site of Work and obtain all information that may be necessary for preparing the Bid and entering into a contract for HVAC Works. The costs of visiting the Site shall be borne by the Bidder. (Timings 2.00 pm to 5.00 pm – Monday to Friday).

21. The unit rates and the prices shall be quoted by the bidder in Indian Rupees.

22. **Performance Guarantee & Security Deposit**:

    On award of work – The bidder should furnish 5% of Work Order value as performance guarantee in the form of DD or Bank Guarantee of any Scheduled Bank. This performance guarantee will be returned after due date from the satisfactory completion of work, providing the work has been carried out in accordance with agreement provision.

The Performance Guarantee shall be valid through the period of completion of work, plus six months as claim period.

Security Deposit: The contractor, immediately on completion of the work, has to furnish a security deposit of 5% (Five Percent) of the **'Work Order value'** of work in the form of bank guarantee from a scheduled bank in the prescribed form. The bank guarantee shall be valid for the entire defect liability period/Warranty period plus six months claim period. In the event of contractor failing to furnish the security deposit on completion of the work, the performance guarantee already submitted will be converted into security deposit. The bidder is expected to comply with relevant labour laws while executing the work.

23. The bidder shall be responsible for the safety and health of all the workers during the execution of work.

24. The contractor should execute the work in all respect, strictly in accordance with specifications, drawings, orders, etc.

25. Samples of all materials to be incorporated in the work shall be submitted for the approval before starting the work without claiming any extra cost.

26. The Institute should have no liability to the bidder, if he/she incurs loss on account of stoppage of work or delay due to violation with respect to safety and quality procedure.

27. The rates quoted by the Contractor should be exclusive of all taxes applicable, taxes and other levies should be indicated separately.

28. For specialized items the work shall be carried out completely as per the manufacturer's specifications and recommendations/CPWD specifications/IS specifications, if the item specifications are incomplete.

29. The work to be carried out under the Contract shall, except as otherwise provided in these conditions, include all labour, materials, tools, plants, equipment and transport which may be required in preparation of and for the full and entire execution and completion of the works. The descriptions given in the Schedule of Quantities shall, unless otherwise stated, be held to include wastage on materials, carriage and cartage, carrying and return of empties, hoisting, setting, fitting and fixing in position and all other labours necessary in and for the full and entire execution and completion of the work as aforesaid in accordance with good practice and recognized principles.

30. **Payment Terms:** 70% of the value of each BOQ item shall be paid upon supply, delivery, inspection and acceptance of the materials/equipment at site, in accordance with the approved technical specifications, drawings and BOQ, subject to submission of the required manufacturer's documents, test certificates and other applicable documents. The balance

30% of the value of each BOQ item shall be paid upon completion of installation, testing and commissioning of the respective item/system and successful completion of the entire electrical works, including functional testing, submission of test reports, as-built drawings, operation and maintenance manuals, warranties/guarantees and other required completion documents, followed by final inspection and acceptance by the Engineer-in-Charge.

Note: No payment shall be considered due for incomplete, defective or uncommissioned works, and the final 30% shall be released only after satisfactory completion and handover of the entire project.

31. All disputes/Arbitration if any are subject to jurisdiction of courts in Bangalore only.

32. In addition to the above mentioned all terms & conditions, the tenderer shall execute the work as per the latest CPWD General Conditions of Contract (GCC).

Special Terms and conditions:

1. Site Engineer (Preferably Electrical Engineer) with sound experience in similar projects has to be deployed for this project and the details of the person has to be attached along with the technical bid.

2. The bidder shall ensure the work area/campus is kept clean and make necessary arrangements to avoid disturbance to the staff in surrounding buildings of the Institute campus in an environmentally friendly way.

3. The Extra items will be paid based on the market rate with contractor profit of 15%.

4. All extra item/substitution item will be derived on the basis of latest General Conditions of Contract of CPWD.

5. Price escalation clause is not applicable.

SELF ATTESTED COPY OF THE FOLLOWING DOCUMENTS SHALL BE SUBMITTED ALONG WITH TECHNICAL BID, FAILING WHICH THE TENDERS ARE LIABLE TO BE REJECTED

1. Bid declaration submitted on the letter head as per the format enclosed.
2. Self-declaration towards not having record of poor performance such as abandoning the works / not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc., has to be provided.
3. Work completion certificates issued by the authority concerned to establish work experience.
4. Documentary proof for having executed the work of similar nature and comparable magnitude as per the eligibility criteria.
5. Work completion certificates for works issued by private parties shall be supported by TDS (Tax Deducted at Source) certificates.
6. Similar work shall mean Supply, Installation, Testing and Commissioning (SITC) of Air Handling Units (AHUs) with VRF/VRV/Chilled water System including all Allied HVAC works.
7. Certified copy of a current Solvency Certificate issued by any Scheduled Bank for the current financial year (2026-27).
8. A list of ongoing works indicating financial commitment for each of these works during the stipulated period of completion mentioned for the subject tender as per the FORM - D.
9. PAN and GST details.
10. Earnest Money Deposit. In case the tenderer is claiming any exemption under NSIC/MSME registration, copy of relevant valid registration certificate clearly indicating the registered value and monitory limit should be attached.
11. Project commitment letter submitted on the letter head as per the format enclosed.
12. Company profile with details.
13. ADDITIONAL documents if any.

FORM 'A'

FINANCIAL INFORMATION

1. Financial Analysis – Details to be furnished duly supported by figures in balance sheet/ profit and loss account for the last five years duly certified by the Chartered Accountant, as submitted by the applicant to the Income Tax Institute (copies to be scanned & uploaded)

Particular	Financial Year				
	2021-22	2022-23	2023-24	2024-25	2025-26
(i) Gross Annual Turnover					
(ii) Profit / Loss (Standalone)					
(iii) Certified by					

2. Financial arrangements for carrying out the proposed work.

3. The following certificates are to be submitted:

   (a) Profit & loss account certified by CA & as submitted to Income Tax Institute.
   (b) Solvency Certificate from bankers in the Form 'B'

Signature of
Chartered Accountant with seal

FORM 'B'

FORM OF BANKER'S CERTIFICATE FROM A SCHEDULED BANK

This is to certify that to the best of our knowledge and information that M/s.__(With address) a customer of our bank are/ is respectable and can be treated as good for any engagementup to a limit of Rs._____(Rupees__).

This certificate is issu-d without any guarantee or responsibility on the bank or any of the officers.

(Signature)

For the Bank

NOTE: (1) Banker's certificate should be on letter head of the Bank.

FORM 'C'

DETAILS OF ALL SIMILAR WORKS COMPLETED IN ALL RESPECT DURING THE LAST SEVEN YEARS ENDING PREVIOUS DAY OF LAST DATE OF SUBMISSION OF TENDERS (STARTING WITH LATEST WORK)

SL.NO	Name of work/ project and location	Owner or sponsoring organization	Cost of work rupees (in lakhs)	Date of commencement as per contract	Stipulated date of completion	Actual date of completion	Litigation/ arbitration pending/ in progress with details*	Name and address/ phone no of officer to whom reference may be made	Remarks
1									

*Indicate gross amount claimed and amount awarded

by the Arbitrator. Notes:

(i) The tenderer may submit separate form for giving details of work (completed) for each year tofill up the details as above. Separate sheets if any shall be numbered in sequence.

(ii) The copies of the work orders for each work be enclosed.

(iii) Certified that the above list of works is complete and no work has been left-out and the information given is correct to my knowledge and belief.

(iv) The hard copy of all similar works completed during the last seven years ending previous day of last date of submission of tenders (starting with latest work) shall also be submitted along with the technical bid.

FORM 'D'

DETAILS OF ALL WORKS OF ANY NATURE UNDER EXECUTION OR AWARDED

(No works shall be left out)

SL.NO	Name of work/ project and location	Owner or sponsori	Cost of work rupees(in lakhs)	Date of commencement as percontract	Stipulated date of completion	Up to date percentage progress	Slow progress If any & reasons there of	Name and address/ phone No. of officer to whom reference may be made.	Remarks
1									

Notes:

(i) The tenderer may submit separate form for giving details of work (completed) for each year to fill up the details as above. Separate sheets if any shall be numbered in sequence.

(ii) The copies of the work orders for each work be enclosed.

(iii) Certified that the above list of works is complete and no work has been left-outand the information given is correct to my knowledge and belief.

The hard copy of all similar works completed during last seven years ending previous day of last date of submission of tenders (starting with latest work) shall also be submitted along withthe technical bid.

FORM OF BID-SECURITY DECLARATION

[The Bidder shall fill in this Form in accordance with the instructions indicated]

To the Administrative Officer

Raman Research Institute

C.V. Raman Avenue, Sadashivanagar, Bangalore – 560 080

Ref: Tender document No._____dated..... 2026

We, the undersigned declare that:

We know that the bid should be supported by a Bid Security Declaration in accordance with your conditions. We hereby **"Supply, Installation, Testing and Commissioning (SITC) of Air Handling Units (AHUs) with VRF/VRV System including all Allied HVAC works suitable for class 100000 clean room conditions for LASE Lab at RRI Campus, Bengaluru"** Will be firm for a period of 120 days from the date when the tenders are finalized.

We accept to automatically be suspended from being eligible for bidding in any contract in RRI for a period of 3 years from the date of opening of Bid. If we are in breach of our obligation(s) under the bid conditions, because we:

After having been notified of the acceptance of our bid by the Contracting Authority within the period of bid validity:

1) We failed or refused to furnish a Performance Security in accordance with the Condition of the Tender Document of Tender No.....
OR

2) We failed or refused to sign the contract.

We know that this Bid-Securing Declaration will expire, if contract is not awarded to us, upon:

1) Our receipt of your notification to us of the name of the successful bidder or

2). Twenty -eight days after the expiration of our Bid or any extension to it. Dated this _____ day of_____

For and on behalf of M/s._____

Address:

Signature

Name

In the capacity of

(DULY AUTHORISED TO SIGN THE BID)

Location of Work:
Raman Research Institute, C V Raman Avenue, Sadashivanagar, Bangalore-560080.

TECHNICAL SPECIFICATIONS:

Note: The work shall be carried out as per specifications of BOQ / Standard specifications of CPWD and/or Indian Standard Stipulations as the case may be.

PROJECT COMMITMENT LETTER:

To

Raman Research Institute,

Sadashivanagara,

Bangalore-560 080.

Sub: **"Supply, Installation, Testing and Commissioning (SITC) of Air Handling Units (AHUs) with VRF/VRV System including all Allied HVAC works suitable for class 100000 clean room conditions for LASE Lab at RRI Campus, Bengaluru"**

NIT No: **RRI/E&B/HVAC/PT-19/2026-27, Dated: 17.11.2026**

Sir,

We hereby confirm and Commit with the detailed technical inputs mentioned in the tender specificationsand abide by the provisions/terms and conditions of the contract.

For and on behalf of M/s._____ Address:

SignatureName

In the capacity of

(DULY AUTHORISED TO SIGN THE BIDDER)

Agreement Form

This agreement, made the_____day of_____2026, between the Administrative Officer, RRI, Bangalore, India (hereinafter called "the Owner)" of the one part and

_____

[Name and address of contractor] (Hereinafter called "the Contractor") of the other part.

Whereas the Owner is desirous that the **"Supply, Installation, Testing and Commissioning (SITC) of Air Handling Units (AHUs) with VRF/VRV System including all Allied HVAC works suitable for class 100000 clean room conditions for LASE Lab at RRI Campus, Bengaluru"** as part of RRI, Bangalore. (Hereinafter called "the Works") and the Owner has accepted the Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein, at a contract price of Rs.....

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expression should have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to, and they should be deemed toform and be read and construed as part of this Agreement.
2. In consideration of the payments to be made by the Owner to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Owner to execute and complete the Works and remedy any defects therein in conformity in all aspects with the provisions of the Contract.
3. The Owner hereby covenants to pay the Contractor in consideration of the execution and completionof the Works and the remedying the defects wherein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.
4. The following documents should deem to form and be read and construed as part of this Agreement.

In witness whereof, the parties thereto have caused this Agreement to be executed the day and yearfirst before written.

was here unto affixed in the presence of:

Signed, Sealed and Delivered by the said _____ in the presence of:

Binding Signature of Owner (Authorized signatory on behalf of RRI) __

Binding Signature of Contractor (Authorized signatory on behalf of Contractor/Vendor) _____

B. DECLARATIONS BY THE TENDERER/ CONTRACTOR

Item Rate Tender for Works

Memorandum:

Tender Notice No: **RRI/E&B/HVAC/PT-19/2026-27, Dated: 17.11.2026**

Title of Work: **"Supply, Installation, Testing and Commissioning (SITC) of Air Handling Units (AHUs) with VRF/VRV System including all Allied HVAC works suitable for class 100000 clean room conditions for LASE Lab at RRI Campus, Bengaluru".**

a) Estimated cost: Rs. 1.20 Crores (Inclusive of prevailing GST)

b) Earnest Money: Rs. 2,40,000/-

c) Performance guarantee: 5% of Work Order Value

d) Security Deposit: 5% of Work Order Value

e) Time allowed for completion of the work is **75 days from date of issue of work order** as mentioned in the tender.

1. I/ We hereby tender for the execution for the Director, Raman Research Institute for the work specified in this Written Memorandum and the notification inviting tender (NIT) within the time/s specified in the Memorandum at the rates specified in the attached schedule of quantities and in all respects with these specifications, design, drawings and instructions in writing referred to in Rules here of and in clause 11 of the General conditions of Contract (GCC) and with such materials as provided for by and all other respects in accordance with such conditions so far as applicable.

2. Should this tender be accepted in whole or in part, I/We hereby agree to abide by and fulfillall the terms and provisions of General conditions of contract (GCC) and General Guidelines to be read in conjunction with GCC, annexed here to and all the terms and provisions contained in NIT, which has been read by me/ us and explained to me/ us so far as applicable or in default thereof to forfeit and pay to the Director, Raman Research Institute or the successors in Office the sums of money mentioned in the said conditions.

3. In the event of accepting my/ our offer by Institute, I/ We agree to revalidate the earnest money deposited as Performance Guarantee within 15 days from the date of issue of letter of intent/ work order. In case, if I/ We fail to revalidate the same within the period specified including the extended period if any.

4. I/ We agree to execute all the works referred to in the tender documents upon the terms and conditions contained or referred therein and to carry out such deviations may be ordered subject to the condition of clause 12 herein after referred to as the deviation limit at the rates quoted in the tendered documents and those in excess of that limit at the rates to be determined in

accordance with the provision contained in clause 12 of the General conditions of Contract (GCC)

5. I/We hereby declare that I/ We shall treat the tender documents, drawings and other records connected with the work as secret/ confidential documents and shall not communicate the same or use the information in any matter prejudicial to the safety of the country.

6. I/ We declare that I/We **M/s.....** possess a copy of the Specifications of Civil Engineering works/ Specification for Electrical works/ Specification for Air conditioning works of Estate Group, Raman Research Institute, Government of India. I/We have signed the Master copy of the Specifications available in the office of the Estate Group, Raman Research Institute, in token of noting the contents therein.

I/We also declare that I/We have perused in detail and examined closely the specifications and I/We agree to be bound by and comply with all such specifications for this work.

I/We declare that the work will be carried out as per the specification in tender document and as p-r the specifications said above. The items of work not covered in the specifications said above will be carried out as per the specifications in the relevant CPWD specifications, and if not covered in CPWD specifications the work will be carried out as in the relevant specifications of Bureau of Indian Standard, and if not covered in any of the above, the work will be carried out as directed in writing by the Engineer-in-charge.

7. I/We declare that I/W- **M/s.....** are not associated, nor has been associated in the past, directly or indirectly with the consultant or any other entity that has prepared the design, specification and other documents for the project for which tenders are invited.

8. I/We also declare that I/We M/s..... are not associated, nor has been associated in the past, directly or indirectly with the consultant or any other entity who hasbeen engaged by the Institute to provide consulting services for the preparation of supervision of the works for which tenders are invited.

I/We declare that the rates quoted by me/us are on the basis of the above. Dated the .....Day of ..... 2026 Witness

Address Signature of the tenderer/ Contractor

Occupation

The above tender for a sum of Rs..... is hereby accepted by me on behalf of the Director, Raman Research Institute. Dated the .... Day of 2026

Signature of tenderer/ Contractor with legal address/ Witness before Submission of tender

Signature of the Officer by whom accepted

A. DEFINITIONS

1. **CONTRACT:**

The 'Contract' means the documents forming the tender and acceptance thereof and the formal agreement executed between the Administrative Officer, Raman Research Institute and the Contractor, together with the documents referred to therein including these conditions, thespecifications, design, drawings and instructions issued from time to time through correspondences through letters and emails and site orders by the inspecting officers & Engineer-in-charge and all these documents taken together shall be deemed to form one contract and shall be complementary to one another.

2. **CONTRACTOR:**

The 'Contractor' means the individual or firm or company, whether incorporated or not, undertaking the work and shall include the legal personal representatives of such individualor the persons composing such firm or the successors of such firm or company and the permitted assignee of such individual or firm or firms or company.

3. **INSTITUTE:**

'INSTITUTE' means Raman Research Institute, Government of India.

4. **ENGINEER-IN-CHARGE:**

The 'Engineer-in-charge' means the Technical Officer-A, RRI, as the case may be, or the appropriate competent authority declared by the Institute who shall supervise and be in charge of the work and who shall sign the contract on behalf of the Director, RRI.

5. **WORK (S):**

The expression 'Works' or 'Work' shall unless there is something either in the subject or context repugnant to such construction, be construed and taken to mean the works by or by virtue of the contract contracted to be executed whether temporary or permanent and whether original, altered, substituted or additional.

6. **SITE:**

The 'Site' means the land/or other places on, into or through which work is to be executed under th- contract or any adjacent land, path or street through which work is to be executedunder the contract or any adjacent land, path or street which m-y be allotted or used for the purpose of carrying out the contract.

7. MARKET RATE:

'Market Rate' shall be the rate as decided by the Engineer-in-charge on the basis of the cost of materials and labor at the site including applicable taxes, duties and also the transportation charge to where the work is to be executed plus the percentage mentioned in schedule `F' to cover all overheads and profits.

8. SCHEDULE OF RATES (SOR):

'Schedule of Rates' of the Institute mentioned in the schedule `F' here under, with the amendments thereto issued up to the date of receipt of tender.

9. TENDERED VALUE:

'Tendered Value' means the value of the entire work as stipulated in the letter of award or work order.

B. GENERAL CONDITIONS OF CONTRACT (GCC)

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CLAUSE 1

PERFORMANCE GUARANTEE

(i) The contractor shall submit an irrevocable Performance Guarantee of 5% (Five percent) of the 'tendered amount' in addition to other deposits mentioned elsewhere in the contract for his proper performance of the contract agreement, (not withstanding and/or without prejudice to any other provisions in the contract) within period of 15 days from the date of issue of letter of acceptance. This period can be further extended by the Engineer-in-charge up to a maximum period of 15 days on written request of the contractor stating the reason for delays in furnishing the Guarantee, to the satisfaction of the Engineer-in-charge. This guarantee shall be in the form of Cash (in case guarantee amount is less than Rs.10,000/-) or Deposit at Call receipt of any scheduled bank/Banker's Cheque of any scheduled bank/Demand Draft of any scheduled/Pay Order of any scheduled bank (in case guarantee amount is less than Rs.1,00,000/-) or Government Securities or Fixed Deposit Receipts or Guarantee Bonds of any Scheduled Bank or the State Bank of India in accordance with the form annexed hereto. In case a fixed deposit receipt of any Bank is furnished by the contractor to the Government as part of the performance guarantee and the Bank is unable to make payment against the said fixed deposit/receipt, the loss caused thereby shall fall on the contractor and the contractor shall forthwith on demand furnish additional security to the Government to make good the deficit.

(ii) The Performance Guarantee shall be valid through the period of completion of work, plus six months as claim period. In case the time for completion of work gets enlarged, the contractor shall get the validity of Performance Guarantee extended to cover such enlarged time for completion of work. After satisfactory taking over the building/facility, with no defects, the performance guarantee shall be returned to the contractor without any interest within 15 days.

(iii) In case of works where high value equipment's under AC/ Electric-l/ Mechanical are involved and wherever explicitly mentioned in this contract, for such works, the Performance Guarantee shall be refunded only after the defect liability period of one year from the date of completion.

(iv) The Engineer-in-Charge shall not make a claim under the performance guarantee except for amounts to which the RRI is entitled under the contract (not withstanding and/or without

prejudice to any other provisions in the contract agreement) in the event of:

a) Failure by the contractor to extend the validity of the Performance Guarantee as described herein above, in which event the Engineer-in-Charge may claim the full amount of the Performance Guarantee.

b) Failure by the contractor to pay RRI any amount due, either as agreed by the Contractor or determined under any of the Clauses/Conditions of the agreement, within 30 days of the service of notice to this effect by Engineer-in-Charge.

(v) In the event of the contract being determined or rescinded under provision of any of the Clause/Condition of the agreement, the performance guarantee shall stand forfeited in full and shall be absolutely at the disposal of the RRI.

CLAUSE 1A

SECURITY DEPOSIT

On completion of the work 5% of the tendered value will be deducted in the running account bills. The security deposit be valid for the entire defect liability period mentioned in Clause 17A and for an additional period of three months. The security deposit will be returned after satisfactory completion of the work as well as defect liability if any, either at the time of execution or during defect liability or non-compliance of due performance of contract, the balance payable will be forfeited. In the event of contractor failing to furnish the security deposit on completion of the work, the performance guarantee already submitted will be converted into security deposit.

All compensations or the other sums of money payable by the contractor under the terms of this contract shall be deducted from this security deposit.

CLAUSE 2A
COMPENSATION FOR DELAY

If the contractor fails to maintain the required progress in terms of clause 5 or to complete the work and clear the site on or before the contract or extended date of completion, he shall, without prejudice to any other right or remedy available under the law to the Institute on account of such breach, pay as agreed compensation, the amount calculated as stipulated below for every completed day/ month (as applicable) that the progress remains below that specified in Clause 5 or

that the work remains incomplete. This will also apply to items or group of items for which a separate period of completion has been specified.

Compensation for delay of work	@ 1% per every week of delay will be levied.

Provided always that the total amount of compensation for delay to be paid under this Condition shall not exceed 10% of the total tendered value of work or of the tendered value of the item or group of items of work for which a separate period of completion is originally given. The amount of compensation may be adjusted or set-off against any sum payable to the contractor under this or any other contract with the Institute.

CLAUSE 2B DELETED

CLAUSE 3

DETERMINATION OF CONTRACT

Subject to other provisions contained in this clause, the Engineer-in-charge may, without prejudice to his any other rights or remedy against the contractor in respect of any delay, inferior workmanship, any claims for damages and/or any other provisions of this contractor otherwise, and whether the date of completion has or has not elapsed, by notice in writingabsolutely determine the contract in any of the following cases:

i) If the contractor having been given by the Engineer-in-Charge a notice in writing to rectify, reconstruct or replace any defective work or that the work is being performed in an inefficient or otherwise improper or un-workman like manner shall omit to comply with the requirement of such notice for a period of seven days thereafter.

ii) If the contractor has, without reasonable cause, suspended the progress of the work or has failed to proceed with the work with due diligence so that in the opinion of the Engineer- in-Charge (which shall be final and binding), he will be unable to secure completion of the work by the date for completion and continues to do so after a notice in writing of seven days from the Engineer-in-Charge.

iii) If the contractor fails to complete the work within the stipulated date or items of work with individual date of completion, if any stipulated, on or before such date(s) of completion and does not complete them within the period specified in a notice given in writing in that behalf by the Engineer-in-Charge.

iv) If the contractor persistently neglects to carry out his obligations under the contract and/ or commits default in complying with any of the terms and conditions of the contract and does not remedy it or take effective steps to remedy it within 7 days after a notice in writing is given to him in that behalf by the Engineer-in-Charge.

v) If the contractor shall offer or give or agree to give to any person in Government service or to any other person on his behalf any gift or consideration of any kind as an inducement or reward for doing or forbearing to do or for having done or forborne to do any act in relation to the obtaining or execution of this or any other contract for Government.

vi) If the contractor shall enter into a contract with Government in connection with which commission has been paid or agreed to be paid by him or to his knowledge, unless the particulars of any such commission and the terms of payment thereof have been previously disclosed in writing to the Engineer-in-Charge.

vii) If the contractor had secured the contract with Government as a result of wrong tendering or other non-bonafide methods of competitive tendering or commits breach of Contract or Integrity Agreement.

viii) If the contractor being an individual, or if a firm, any partner thereof shall at any time be adjudged insolvent or have a receiving order or order for administration of his estate made against him or shall take any proceedings for liquidation or composition (other than a voluntary liquidation for the purpose of amalgamation or reconstruction) under any Insolvency Act for the time, being in force or make any conveyance or assignment of his effects or composition or arrangement for the benefit of his creditors or purport so to do, or if any application be made under any Insolvency Act for the time being in force for the sequestration of his estate or if a trust deed be executed by him for benefit of his creditors.

ix) If the contractor being a company shall pass a resolution or the court shall make an order that the company shall be wound up or if a receiver or a manager on behalf of a creditor shall be appointed or if circumstances shall arise which entitle the court or the creditor to appoint a receiver or a manager or which entitle the court to make a winding up order.

x) If the contractor shall suffer an execution being levied on his goods and allow it to be continued for a period of 21 days.

xi) If the contractor assigns, transfers, sublets (engagement of labour on

a piece-work basis or of labour with materials not to be incorporated in the work, shall not be deemed to be subletting) or otherwise parts with or attempts to assign, transfer, sublet or otherwise parts with the entire works or any portion thereof without prior written approval of the Engineer-in-charge.

When the contractor has made himself liable for action under any of the cases aforesaid, the Engineer-in-charge on behalf of the Director, Raman Research institute shall have powers:

a) To determine the contract as aforesaid (of which termination notice in writing to the contractor under the hand of the Engineer-in-charge shall be conclusive evidence). Upon such determination, Performance Guarantee under the contract shall be liable to be forfeited and shall be absolutely at the disposal of the Institute.

b) After giving notice to the contractor to measure up the work of the contractor and to take such whole, or the balance or part thereof, as shall be un-executed out of his hands and to give it to another contractor to complete the work. The contractor, whose contract is determined as above, shall not be allowed to participate in the tendering process for the balance work.

In the event of above courses being adopted by the Engineer-in-charge, the contractor shall have no claim to compensation for any loss sustained by him by reasons of his having purchased or procured any materials or entered into any engagements or made any advances on account or with a view to the execution of the work or the performance of the contract. And in case action is taken under any of the provision aforesaid, the contractor shall not be entitled to recover or be paid any sum for any work thereof or actually performed under the contract unless and until the Engineer-in-charge has certified in writing the performance of such work and the value payable in respect thereof and he shall only be entitled to be paid the value so certified.

CLAUSE 3A
CLOSING OF CONTRACT BY EITHER PARTY

In case the work cannot be started due to reasons not within the control of the contractor within 1/8th of the stipulated time for completion of work or one month whichever is higher, either party may close the contract. In case contractor wants to close the contract, he shall give notice to the department stating the failure on the part of department. In such eventuality, the Performance Guarantee of the contractor shall be refunded within following time limits, without any interest. The contractor will not be eligible for any compensation for

any damages what so ever caused due to closing of contract.

If the Tendered value of work is,

up to Rs. 45 lakhs: 15 days.

more than Rs.45 lac& up to Rs.2.5 Cr: 21 days.
exceeds Rs. 2.5 Cr: 30 days.

CLAUSE 4
CONTRACTORS REMAIN LIABLE TO PAY COMPENSATION, EVEN IF ACTION NOTTAKEN UNDER CLAUSE 3

In any case in which any of the power conferred upon the Engineer-in-charge by clause 3 thereof shall have become exercisable and the same shall not be exercised, the non- exercise hereof shall not construe a waiver of any of the conditions hereof and such powers shall not be withstanding exercisable in the event of any future case of default by thecontractor and the liability of the Contractor for compensation shall remain unaffected (for which by any clause or clause hereof, he is declared liable to pay compensation amounting to the extent of his security deposit and the liability of the Contractor for past and future compensations shall remain unaffected).

In the event of the Engineer-in-charge putting in force all or any of the powers vested in him under the preceding clauses he may, if he so desires after giving a notice in writing to the Contractor, take possession of (or at the sole discretion of Engineer-in-charge which shall be final) use as on hire (the amount of the hire money being also in the final determination of the Engineer-in-charge) all or any tools, plant, materials and stores in or upon the words or the site then of belongings to the Contractor or procured by the Contractor and intended to be used for the execution of the work or any part thereof paying or allowing for the same in account at the contract rates, or in case of these not being applicable at current market rates to be certified by the Engineer-in-charge whose certificate thereof shall be final, otherwise the Engineer-in-charge may by notice in writing to the Contractor or his clerk of the works, foreman or authorized agents requesting him/them to remove such tools, plant, materials or stores from the premises (within a time to be specified in such notice) and in the event of the Contractor failing to comply with any such requisition, the Engineer-in-charge may remove them at the Contractor's expenses or sell byauction or private sale on account of the Contractor and at his risk in all respects and the certificate of the Engineer-in-charge as

to the expenses of any such removal and the amount of the proceeds and expenses of any such sale shall be final and conclusive against the Contractor.

CLAUSE 5
TIME AND EXTENSION FOR DELAY

The time allowed for execution of the Works as specified in the Schedule 'F' or the extended time in accordance with these conditions shall be the essence of the Contract. The execution of the works shall commence from such time period as mentioned in schedule 'F' or from the date of handing over of the site whichever is later. If the Contractor commits default in commencing the execution of the work as aforesaid, Government shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the Performance Guarantee absolutely.

5.1 As soon as possible after the Contract is concluded, the Contractor shall submit a Time and Progress Chart for each mile stone and get it approved by the Department. The Chart shall be prepared in direct relation to the time stated in the Contract documents for completion of items of the works. It shall indicate the forecast of the dates of commencement and completion of various trades of sections of the work and may be amended as necessary by agreement between the Engineer-in-Charge and the Contractor within the limitations of time imposed in the Contract documents, and further to ensure good progress during the execution of the work, the contractor shall in all cases in which the time allowed for any work, exceeds one month (save for special jobs for which a separate programme has been agreed upon) complete the work as per mile stones given in Schedule 'F'.

a) Project Management shall be done by using project management software for works costing more than Rs.5 Crore.

b) The project management shall be done using MS Project software for works costing more than Rs. 5 Crore and up to Rs. 20 Cr.

For works costing more than Rs. 20 Crore, project management shall be done using Primavera Software.

Programme Chart

(i) The Contractor shall prepare an integrated programme chart in MS Project/Primavera software for the execution of work, showing clearly all activities from the start of work to completion, with details of manpower, equipment & machinery required for the fulfillment of the programme within the stipulated period or earlier and submit the same

for approval to the Engineer-in-Charge within ten days of award of the contract. A recovery of Rs. 2500/- (for works costing up to Rs.20 Crores)/ Rs. 5000/- (for works costing more than Rs. 20 Crores) shall be made on per day basis in case of delay in submission of the above programme.

(ii) The programme chart should include the following:

a) Descriptive note explaining sequence of the various activities.

b) Network (PERT/CPM/BAR CHART).

c) Programme of procurement of machinery/equipment's having adequate capacity, commensurate with the quantum of work to be done within the stipulated period, by the contractor. In addition to above to achieve the progress of Work as per programme, the contractor must bring at site adequate shuttering material required for cement, Concrete and R.C.C. works etc. for three floors within one month from the date of start of work till the completion of RCC work as per requirement of work. The contractor shall submit shuttering schedule adequate to complete structure work within laid down physical milestone.

(iii) If at any time, it appears to the Engineer-in-Charge that the actual progress of work does not conform to the approved programme referred above or after rescheduling of milestones, the contractor shall produce a revised programme within 7 (seven) days, showing the modifications to the approved programme to ensure timely completion of the work. The modified schedule of programme shall be approved by the Engineer in Charge. A recovery of Rs. 2500/- (for works costing up to Rs. 20 Crores)/Rs. 5000/- (for works costing more than Rs. 20 Crores) shall be made on per day basis in case of delay in submission of the modified programme.

(iv) The submission for approval by the Engineer-in-Charge of such programme or such particulars shall not relieve the contractor of any of the duties or responsibilities under the contract. This is without prejudice to the right of Engineer-in-Charge to take action against the contractor as per terms and conditions of the agreement.

(v) The contractor shall submit the progress report using MS Project/Primavera software with base line programme referred above for the work done during previous month to the Engineer-In-charge on or before 5th day of each month failing which a recovery Rs. 2500/- (for works costing up to Rs. 20 Crores)/Rs. 5000/- (for works costing more than Rs. 20 Crores) shall be made on per day basis in case of

delay in submission of the monthly progress report.

5.2 If the work(s) be delayed by:

i) force majeure, or

ii) abnormally bad weather, or

iii) serious loss or damage by fire, or

iv) local commotion of workmen, strike or lockout, affecting any of the trades employed on the work, or

v) delay on the part of other contractors or tradesmen engaged by Engineer-in-Charge in executing work not forming part of the Contract, or

vi) non-availability of stores, which are the responsibility of Government to supply or

vii) non-availability or break down of tools and Plant to be supplied or supplied by Government or

viii) Any other cause which, in the absolute discretion of the Engineer-in-Charge is beyond the Contractor's control.

Then upon the happening of any such event causing delay, the contractor shall immediately give notice thereof in writing to the authority as indicated in schedule 'F' but shall nevertheless use constantly his best endeavors to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of the Engineer-in-charge to proceed with the works.

5.3 Request for rescheduling of milestones and extension of time, to be eligible for consideration, shall be made by the Contractor in writing within fourteen days of the happening of the event causing delay on the prescribed form Engineer-in-charge. The Contractor may also, if practicable, indicate in such a request the period for which extension is desired.

5.4 In any such case, Engineer-in-charge may give a fair and reasonable extension of time and reschedule the mile stones for completion of work. Such extension or rescheduling of the milestones shall be communicated to the Contractor by

Engineer- in-charge in writing, within 1 month or 4 weeks of the date of receipt of such request respectively. Non-application by the contractor for extension of time/ rescheduling of the milestones shall not be a bar for giving a fair and reasonable extension/ rescheduling of the milestones by Engineer-in-charge and this shall be binding on the contractor.

CLAUSE 6

MEASUREMENT OF WORKDONE

Engineer-in-charge shall, except as otherwise provided, ascertain and determine by measurement, the value in accordance with the contract of work done. All measurement of all items having financial value shall be entered in Measurement Book and / or level field book so that a complete record is obtained of all works performed under the contract.

All measurements and levels shall be taken jointly by the Engineer-in-charge or his authorized representative and by the contractor or his authorized representative from time to time during the progress of the work and such measurements shall be signed and dated by the Engineer-in-charge and the contractor or their representatives in token of their acceptance. If the contractor objects to any of the measurements recorded, a note shall be made to that effect with reason and signed by both the parties.

If for any reason the contractor or his authorized representative is not available and the work of recording measurements is suspended by the Engineer-in-charge or his representative, the Engineer-in-charge and the Institute shall not entertain any claim from contractor for any loss or damages on this account. If the contractor or his authorized representative does not remain present at the time of such measurements after the contractor or his authorized representative has been given a notice in writing three (3) days in advance or fails to countersign or to record objection within a week from the date of the measurement, then such measurements recorded in his absence by the Engineer-in-charge or his representative shall be deemed to be accepted by the contractor.

The contractor shall, without extra charge, provide all assistance with every appliance, labour and other things necessary for measurements and recording levels.

Except where any general or detailed description of the work expressly shows to the contrary, measurements shall be taken in accordance with the procedure set forth in the specifications notwithstanding any provisions in the relevant Standard Method of measurement or any general or local custom. In the case of items which are not covered by specifications, measurements shall be taken in accordance with the relevant standard method of measurement issued by the Bureau of Indian Standards and if for any item no such standard is available, then a mutually agreed method shall be followed.

The contractor shall give, not less than seven days' notice to the Engineer-in-Charge or his authorized representative in-charge of the work, before covering up or otherwise placing beyond the reach of measurement any work in order that the same may be measured and correct dimensions thereof be taken before the same is covered up or placed beyond the reach of measurement and shall not cover up and place beyond reach of measurement any work without consent in writing of the Engineer-in-charge or his authorized representative in-charge of the work who shall within th- aforesaid period of seven days inspect the work, and if any work shall be covered up or placed beyond the reach of measurements without such notice having been given or the Engineer-in-charge's consent being obtained in writing, the same shall be uncovered at the Contractor's expens- or in default thereof no payment or allowance shall be made for such work or the materials with which the same was executed.

Engineer-in-charg- or his authorized representative may cause either themselves or through another officer of the Institute to check the measurements recorded jointly or otherwise as aforesaid and all provisions stipulated herein above shall be applicable to such checking of measurements or levels.

It is also a term of this contract that recording of measurements of any item of work in the measurement book and /or its payment in the interim, on account or final bill shall not be considered as conclusive evidence as to the sufficiency of any work or material to which it relates nor shall it relieve the contractor from liabilities from any over measurement or defects noticed till completion of the defect's liability period.

CLAUSE 6A

COMPUTERIZED MEASUREMENT BOOK

Engineer-in-charge shall, except as otherwise provided, ascertain and determine by measurement the value of work done in accordance with the contract.

All measurements of all items having financial value shall be entered by the contractor and compiled in the shape of the Computerized Measurement Book having pages of A04 size as per the format of the Institute so that a complete record is obtained of all the items of works •erformed under the contract.

All such measurements and levels recorded by the contractor or his

authorized representative from time to time, during the progress of the work shall be got checked by the contractor from the Engineer-in-charge or his authorized representative as per interval or programme fixed in consultation with Engineer-in-charge or his authorized representative. After the necessary corrections made by the Engineer-in-charge, the measurement sheets shall be returned to the contractor for incorporating the corrections and for resubmission to the Engineer-in-charge for the dated signature by the Engineer-in- charge and the contractor or their representatives in token of their acceptance.

Whenever bill is due for payment, the contractor would initially submit draft computerized measurement sheets and these measurements would be got checked/ test checked from the Engineer-in-charge and /or his authorized representative. The contractor will, thereafter, incorporate such changes as may be done during these checks/test checks in his draft computerized measurements, and submit to the Institute a computerized measurement book, duly bound, and with its pages machine numbered. The Engineer-in- charge and/or his authorized representative would thereafter check this MB, and record the necessary certificates for their checks/test checks.

The final, fair, computerized measurement book given by the contractor, duly bound, with its pages machine numbered, should be 100% correct, and no cutting or over writing inthe measurements would thereafter be allowed. If at all any error is noticed, the contractor shall have to submit a fresh computerized MB with its pages duly machine numbered and bound after getting the earlier MB cancelled by the Institute. Thereafter, the MB shall be taken in the Divisional Office records, and allotted a number as per the Register of Computerized MBs. This should be done before the corresponding bill is submitted to the Division Office for payment. The contractor shall submit two spare copies of such computerized MBs for the purpose of reference and record by the various officers of the Institute.

The contractor shall also submit to the Institute separately his computerized Abstract of Cost and bill based on these measurements, duly bound, and its pages machine numbered along with two spare copies of the `bill'. Thereafter, this bill will be processed by Division Office and allotted a number as per the computerized record in the same way as done for the measurement book meant for measurements.

The contractor shall, without extra charge, provide all assistance with every appliance, labour and other things necessary for checking of measurements/levels by the Engineer-in- charge or his representative.

Except where any general or detailed description of the work expressly shows to the contrary, measurements shall be taken in accordance with the procedure set forth in the specifications not withstanding any provision in the relevant Standard Method of measurementor any general or local custom. In the case of items which are not covered by specifications, measurement shall be taken in accordance with the relevant standard method of measurement issued by the Bureau of Indian Standards and if for any item no such standard is available, then a mutually agreed method shall be followed.

The contractor shall give not less than seven days' notice to the Engineer-in-charge orhis authorized representative in charge of the work before covering up or otherwise placing beyond the reach of checking and /or test checking the measurement of any work in order that the same may be checked and /or test checked and correct dimensions thereof be taken before the same is covered up or placed beyond the reach of checking and /or test checking measurement and shall not cover up and place beyond reach of measurement any work without consent in writing of the Engineer-in-charge or his authorized representative in- charge of the work who shall within the aforesaid period of seven days inspect the work, and ifany work shall be covered or placed beyond the reach of checking and/or test checking measurements without such notice having been given or the Engineer-in-charge's consent being obtained in writing the same shall be uncovered at the Contractor's expense, or defaultthereof no payment or allowance shall be made for such work or the materials with which the same was executed.

Engineer-in-charge or his authorized representative may cause either themselves or through another officer of the Institute to check the measurements recorded by contractor andall provisions stipulated herein above shall be applicable to such checking of measurements or levels.

It is also a term of this contract that checking and/or test checking the measurements of any item of work in the measurement book and/or its payment in the interim, on account of final bill shall not be considered as conclusive evidence as to the sufficiency of any work or material to which it relates nor shall it relieve the contractor from liabilities from any over measurement or defects noticed till completion of the defect's liability period.

CLAUSE 7 PAYMENT

Payments will be made through monthly running account bills based

on the works executed on the basis of recorded measurements. The running account bills shall be submitted by the contractor for the works executed on the basis of recorded measurements on the format of the Department in triplicate on or before the date of every month fixed by Engineer-In- Charge.

Engineer-In-Charge shall arrange to have the bills verified by taking or causing to be taken wherever required the requisite measurement of the work. Payments on account of the amounts admissible shall be made by the Engineer-In-Charge certifying the sum to which contractor is considered entitled by way of running account bill at such rates decided by the Engineer-In-Charge.

The amount admissible shall be paid by tenth working day after the day of presentation of the bill by the contractor, together with all details. In the event of failure of the contractor to submit the bill, Engineer-In-Charge shall prepare or cause to be prepared such bill in which event no claim or what so ever on delay in payments shall be entertained.

However, in respect of i) AC works and ii) Mechanical works viz., cranes, Monorail, special conveyor system, sliding doors, platforms, passenger/service lifts, compressed air facility, hot water guarantors, rotors, flash mixers and agitators etc., a) 76.5% pro-rata payment will be made on delivery of equipment and subject to acceptance by conducting necessary tests.

b) 13.5% pro-rata payment on completion of installation and c) 10.0% on completion of testing, commissioning and handing over.

All payments made against running accounts will be treated as intermediate advances which will finally be adjusted in the final bill, prepared on completion of the work and shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be rejected, removed, taken away and reconstructed or re-erected.

Any certificate given by the Engineer- in-Charge relating to the work done or materials delivered forming part of such payment, maybe modified or corrected by any subsequent such certificate(s) or by the final certificate and shall not by itself be conclusive evidence that any work or materials to which it relates is/are in accordance with the contract and specifications.

Any such interim payment, or any part thereof shall not in any respect conclude, determine or affect in any way powers of the Engineer-in-Charge under the contract or any of such payments be treated as final settlement

and adjustment of accounts or in any way vary or affect the contract.

Pending consideration of extension of date of completion, interim payments shall continue to be made as herein provided without prejudice to the right of the department to take action under the terms of this contract for delay in the completion of work, if the extension of date of completion is not granted by the competent authority.

Engineer-in-Charge in his sole discretion to the effect that the work has been completed up to the level in question make interim advance payments without detailed measurements for work done (other than foundations, items to be covered under finishing items) up to lintel level (including sunshade etc.) and slab level, for each floor working out at 75% of the assessed value. The advance payments so allowed shall be adjusted in the subsequent interim bill by taking detailed measurements thereof.

Engineer-in-Charge in his sole discretion to the effect that the work has been completed up to the level in question make interim advance payments without detailed measurements for work done (other than foundations, items to be covered under finishing items) up to lintel level (including sunshade etc.) and slab level, for each floor working out at 75% of the assessed value.

The advance payments so allowed shall be adjusted in the subsequent interim bill by taking detailed measurements thereof.

CLAUSE 8

COMPLETION CERTIFICATE

Within ten days of the completion of work, the Contractor shall give notice of such completion to the Engineer-in-charge and within ten days of receipt of such notice the Engineer-in- charge shall inspect the work and if there is no defect in the work, shall furnish the Contractor with a certificate of completion, otherwise a provisional certificate of completion indicating the defects (a) to be rectified by the Contractor and/or (b) for which payment will be made at reduced rates shall be issued but no such certificate of completion provisional or otherwise shall be issued nor shall the work be considered to be complete until the Contractor shall have removed from the premises on which the work shall be executed all scaffolding surplus material and rubbish and all huts and sanitary arrangements required for this or their work people on the site in connection with execution of works shall have been erected or constructed by the Contractor and cleaned off the dirt from all the wood

works, doors, windows, walls, floors or which other parts of any building in upon or about the work is to be executed or any of which he may had possession for the purpose of execution thereof and not until the work shall have been measured by the Engineer-in-charge. If the Contractor shall fail to comply with requirements of this clause as to removal of scaffoldings, surplus materials and rubbish and all huts and sanitary arrangements as aforesaid and cleaning of dirt on or before the date fixed for the completion of the work, the Engineer-in-charge may, at the expense of the Contractor remove such scaffolding, surplus materials and rubbish etc., and dispose of the same as he thinks fit clean of such dirt as aforesaid, and the Contractor shall forthwith pay the amount of all expense so incurred and shall have no claim in respect of any such scaffolding or surplus materials as aforesaid except for any sum actually realized by the sale thereof.

CLAUSE 8A

CONTRACTOR TO KEEP SITE CLEAN

When the annual repair and maintenance work is carried out, the splashes and droppings from whitewashing, color washing, painting etc., on walls, floors, doors, windows etc., shall be removed and the surface cleared simultaneously with the completion of these items of work in the individual rooms, quarters or premises etc., where the work is done without waiting for the actual completion of all the other items or work in the contract. In case the Contractor fails to comply with requirement of this clause, the Engineer-in-charge shall have the right to get this work done at the cost of the Contractor either Institute ally or through another agency. Before taking such action, the Engineer-in-charge shall give ten days' notice in writing to the Contractor.

CLAUSE 8B DELETED

CLAUSE 9

PAYMENT OF FINAL BILL

The final bill shall be submitted by the contractor in the same manner as specified in interim bills within three months of physical completion of the work or within one month of the date of the final certificate of completion furnished by the Engineer-in-Charge whichever is earlier. No further claims shall be made by the contractor after submission of the final bill and these shall be deemed to have been waived and extinguished. Payments of those items of the bill in respect of which there is no dispute and of items in dispute, for quantities and rates as

approved by Engineer-in-Charge, will, as far as possible-be made within the period specified herein under, the period being reckoned from the date of receipt of the bill by the Engineer-in- Charge or his authorized persons, complete with account of materials issued by the Department and dismantled materials.

If the Tendered value of work is,

up to Rs. 45 lakhs: 2 months.
more than Rs.45 lac& up to Rs.2.5 Cr: 3 months.exceeds Rs. 2.5 Cr: 6 months.

CLAUSE 9A
PAYMENT OF CONTRACTOR'S BILL TO BANKS

Payments due to the Contractor may, if so desired by him, be made to his bank instead ofdirect to him provided that Contractor furnishes to the Engineer-in-charge;

1) an authorization in the form of legally valid documents such as a power of attorney conferringauthority on the bank to receive payment and

2) His own acceptance of the correctness of the account made out as being due to him by Institute or his signature on the bill or other claims preferred against Institute before settlement by the Engineer-in-charge of the account or claim by payment to the Bank. While the receipt given by such bank shall constitute a full and sufficient discharge for the payment, the Contractor should whenever possible present his bills duly receipted and discharged through his bankers.

Nothing herein contained shall operate to cr-ate in favor of the bank any rights or equitiesvis-à-vis the Director, Raman Research Institute.

CLAUSE 10

MATERIALS SUPPLIED BY THE INSTITUTE DELETED

CLAUSE 10A

MATERIALS TO BE PROVIDED BY THE CONTRACTOR

The contractor shall, at his own expense, provide all materials, required for the work other than those which are stipulated to be supplied by the Government.

The contractor shall, at his own expense and without delay, supply to

the Engineer-in-charge samples of materials to be used on the work and shall get these approved in advance. All such materials to be provided by the Contractor shall be in conformity with the specifications laid down or referred to in the contract. The contractor shall, if requested by the Engineer-in-charge furnish proof, to the satisfaction of the Engineer-in-charge that the materials so comply.

The Engineer-in-charge shall within thirty days of supply of samples or within such further period as he may require intimate to the Contractor in writing whether samples are

approved by him or not. If samples are not approved, the Contractor shall forthwith arrange to supply to the Engineer-in-charge for his approval, fresh samples complying with the specifications laid down in the contract. When materials are required to be tested in accordance with specifications, approval of the Engineer-in-charge shall be issued after the test results are received.

The Contractor shall at his risk and cost submit the samples of materials to be tested or analyzed and shall not make use of or incorporate in the work any materials represented by the samples until the required tests or analysis have been made and materials finally accepted by the Engineer-in-charge. The Contractor shall not be eligible for any claim or compensation either arising out of any delay in the work or due to any corrective measures required to be taken on account of and as a result of testing of materials.

The contractor shall, at his risk and cost, make all arrangements and shall provide all facilities that the Engineer-in-charge may require for collecting, and preparing the required number of samples of such tests at such time and to such place or places as may be directed by the Engineer-in-charge and bear all charges and cost of testing unless specifically provided for otherwise elsewhere in the contract or specifications. The Engineer- in-charge or his authorized representative shall at all times have access to the works and to all workshops and places where work is being prepared or from where materials, manufactured articles or machinery are being obtained for the works and the contractor shall afford every facility and every assistance in obtaining the right to such access.

The Engineer-in-charge shall have full powers to require the removal from the premises all materials which in his opinion are not in accordance with the specifications and in case of default, the Engineer-

in-charge shall be at liberty to employ at the expense of the contractor, other persons to remove the same without being answerable or accountable for any loss or damage that may happen or arise to such materials. The Engineer-in-charge shall also have full powers to require other proper materials to be substituted thereof and in case of default, the Engineer-in-charge may cause the same to be supplied and all costs which may attend such removal and substitution shall be borne by the Contractor.

The contractor shall at his own expense, provide a material testing lab at the site for conducting routine field tests. The lab shall be equipped at least with the testing equipment as specified in schedule F.

CLAUSE 10B (i)

SECURED ADVANCE

The contractor, on signing an indenture in the form to be specified by the Engineer-in- charge, shall be entitled to be paid during the progress of the execution of the work up to 90% of the assessed value of any materials which are in the opinion of the Engineer-in- charge non-perishable, non-fragile and non-combustible and are in accordance with the contract and which have been brought on the site in connection therewith and are

adequately stored and/ or protected against damage by weather or other causes but which have not at the time of advance been incorporated in the works. When materials on account of which an advance has been made under this sub-clause are incorporated in the work, the amount of such advance shall be recovered/ deducted from the next payment made under any of the clause or clauses of this contract.

Such secured advance shall also be payable on other items of perishable nature, fragile and combustible with the approval of the Engineer-in-charge, provided the contractor provides a comprehensive insurance cover for the full cost of such materials. The decision of the Engineer-in-charge shall be final and binding on the contractor in this matter. No secured advance shall however, be paid on high-risk materials such as ordinary glass, sand, petrol, diesel, etc.

CLAUSE 10B (ii) – DELETED

CLAUSE 10 C– DELETED

CLAUSE 10 D

DISMANTLED MATERIALS ARE GOVERNMENT PROPERTY

The Contractor shall treat all materials obtained during dismantling of a structure, excavation of the site for a work etc., as Government's property and such materials shall be disposed off to the best advantage of Government according to instructions in writing issued by the Engineer-in-charge.

CLAUSE 10E – DELETED

CLAUSE11

WORK TO BE EXECUTED IN ACCORDANCE WITH SPECIFICATIONS, DRAWINGS,ORDERS, ETC.,

The contractor shall execute the whole and every part of the work in the most substantial and workmanlike manner both as regards materials and otherwise in every respect in strict accordance with the specifications. The contractor shall also conform exactly, fully and faithfully to the design, drawings and instructions in writing in respect of the work signed by the Engineer-in-Charge and the contractor shall be furnished free of charge one copy of the contract documents together with specifications, designs, drawings and instructions as are not included in the standard specifications of the Institute or in Central Public Works Institute or in any Bureau of Indian Standard or any other, published standard or code or, Schedule of Rates or any other printed publication referred to elsewhere in the contract.

The contractor shall comply with the provisions of the contract and with the care and diligence execute and maintain the works and provide all labour and materials, tools and plants including for measurements and supervision of all works, structural plans and other things of temporary or permanent nature required for such execution and maintenance in so far as the necessity for providing these, is specified or is reasonably inferred from the contract. The Contractor shall take full responsibility for adequacy, suitability and safety of all the works and methods of construction.

CLAUSE 11A
ACTION WHERE NO SPECIFICATION

In the case of any class of work for which there is no Institute specifications

such work shall be carried out generally in accordance with CPWD specification and if there are no details of CPWD specification book then it shall be executed as per Bureau of Indian Standard specification. In case there is no such specification in Bureau of Indian Standards the work shall be carried out in all respects in accordance with the instruction and requirement of the Engineer-in-charge.

CLAUSE 12

DEVIATIONS/ VARIATIONS E TENT AND PRICING

The Engineer-in-charge shall have power (i) to make alteration in, omissions from, additions to, or substitutions for the original specifications, drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of the work, and (ii) to omit a part of the work(s) in case of non-availability of a portion of the site or for any other reasons and the contractor shall be bound to carry out the works in accordance with any instructions given to him in writing signed by the Engineer-in-charge and such alterations, omissions, additions or substitutions shall form part of the contract as if originally provided therein and any altered, additional or substituted work which the contractor may be directed to do in the manner specified above as part of the works, shall be carried out by the contractor on the same conditions in all respects including price on which he agreed to do the main work except as hereafter provided:

12.1 : The time for completion of the works shall, in the event of any deviations resulting in additional cost over the tendered value sum being ordered, be extended, if requested by the contractor, as follows:

i) In the proportion which the additional cost of the altered, additional or substituted work, bears to the original tendered value plus.

ii) 25% of the time calculated in (i) above or such further additional time as may be considered reasonable by the Engineer-in-charge.

12.2 : Extra items and pricing

A. For major works:

In the case of Extra items (items that are completely new, and are in addition to the items contained in the contract) , the contractor may within 15 days of receipt of order or occurrence of the item(s), claim rate supported by proper analysis, for the work and the Engineer-in-charge shall within prescribed time limit of the receipt of the claims supported by analysis after giving consideration to the analysis of the

rates submitted by the contractor, determine the rates on the basis of market rates and the contractor shall be paid in accordance with the rates so determined.

12.3 : Substituted item, pricing

A. For major/ capital works:

In the case of substituted items (items that are taken up with partial substitution are in lieu of items of work in the contract), the rate for the agreement item (to be substituted) and substituted item shall also be determined in the manner as mentioned in the following para.

i) If the market rate for the substituted item so determined is more than the market rate of the agreement item (to be substituted), the rate payable to the contractor for the substituted item shall be the rate for the agreement item (to be substituted) so increased to the extent of the difference between the market rates of substituted item and the agreement item (to be substituted).

ii) If the market rate for the substituted item so determined is less than the market rate of the agreement item (to be substituted), the rate payable to the contractor for the substituted item shall be the rate for the agreement item (to be substituted) so decreased to the extent of the difference between the market rates of substituted item and the agreement item (to be substituted).

12.4 : Deviated quantities, pricing

A. For major/ capital works:

In the case of contract items, substituted items, contract cum substituted items, which exceed the limits as below, the contractor may within fifteen days of receipt of order of occurrence of the excess, claim revision of the rates, supported by proper analysis for the work in excess of the above mentioned limits, provided that if the rates so claimed are in excess of the rates specified in the schedule of quantities, the Engineer-in-charge shall within prescribed time limit of receipt of the claims supported by analysis, after giving consideration to the analysis of the rates submitted by the contractor, determine the rates on the basis of market rates and the contractor shall be paid in accordance with the rates so determined.

Prescribed time limits are as under:

If the Tendered value of work is

up to Rs.45 lac : 30 days.

More than Rs.45 lac and up to Rs. 2.5 Cr : 45days.

Exceeds Rs. 2.5 Cr : 60days.

A. For major/ capital works:

The provisions of the preceding paragraph shall also apply to the decrease in the rates of items for the work in excess of limits laid down in Schedule ' F ', and the Engineer-in- charge shall after giving notice to the contractor within one month of occurrence of the excess and after taking into consideration any reply received from him within fifteen days of the receipt of the notice, revise the rates for the work in question within one month of the expiry of the said period of fifteen days having regard to the market rates.

12.6:

The contractor shall send to the Engineer-in-charge once in a month, an up to-date account giving complete details of all claims for additional payments to which the contractor may consider himself entitled and of all additional work ordered by the Engineer-in-charge which he has executed during the preceding quarter failing which the contractor shall be deemed to have waived his right. However, the Administrative Officer, RRI may authorize consideration of such claims on merits.

12.7:

Any operation incidental for proper execution of the item included in the Schedule of quantities or in the Schedule of rates mentioned above, whether or not, specifically indicated in the description of the item and the relevant specifications, shall be deemed to be included in the rates quoted by the tenderer or the rate given in the said schedule of rates as the case may be. Nothing extra shall be admissible for such operations.

CLAUSE 13
FORE CLOSURE OF CONTRACT DUE TO ABANDONMENT OR REDUCTION IN SCOPE OF WORK

If at any time after acceptance of the tender, Engineer-in-Charge shall decide to abandon or reduce the scope of the works for any reason whatsoever and hence not require the whole or any part of the works to be carried out, the Engineer-in-Charge shall give notice in writing to that effectto the contractor and the contractor shall act accordingly in the matter. The contractor shall have noclaim to any payment of compensation or otherwise whatsoever, on account of any profit or advantage which he might have derived from the

execution of the works in full but which he did not derive in consequence of the foreclosure of the whole or part of the works.

The contractor shall be paid at contract rates, full amount for works executed at site and, in addition, a reasonable amount as certified by the Engineer-in-Charge for the items hereunder mentioned which could not be utilized on the work to the full extent in view of the foreclosure;

(i) Any expenditure incurred on preliminary site work, e.g., temporary access roads, temporary labor huts, staff quarters and site office, storage accommodation and water storage tanks.

(ii) Government/Department shall have the option to take over contractor's materials or any part thereof either brought to site or of which the contractor is legally bound to accept delivery from suppliers (for incorporation in or incidental to the work) provided, however Government/ Department shall be bound to take over the materials or such portions thereof as the contractor does not desire to retain. For materials taken over or to be taken over by Government/ Department, cost of such materials as detailed by Engineer-in- Charge shall be paid. The cost shall, however, take into account purchase price, cost of transportation and deterioration or damage which may have been caused to materials whilst in the custody of the contractor.

(iii) If any materials supplied by Government/ Department are rendered surplus, the same except normal wastage shall be returned by the contractor to Government/ Department at rates not exceeding those at which these were originally issued, less allowance for any deterioration or damage which may have been caused whilst the materials were in the custody of the contractor. In addition, cost of transporting such materials from site to Government/ Department stores, if so, required by Government/ Department, shall be paid.

(iv) Reasonable compensation for transfer of T & P from site to contractor's permanent stores or to his other works, whichever is less. If T & P are not transported to either of the said places, no cost of transportation shall be payable.

(v) Reasonable compensation for repatriation of contractor's site staff and imported labour to the extent necessary.

The contractor shall, if required by the Engineer- in-Charge, furnish to him, books of account, wage books, time sheets and other relevant documents and evidence as may be necessary to enable him to certify the reasonable amount payable under this condition.

The reasonable number of items on (i), (iv) and (v) above shall not be in excess

of 2% of the cost ofthe work remaining incomplete on the date of closure, i.e., total stipulated cost of the work as per accepted tender less the cost of work actually executed under the contract and less the cost of contractor's materials at site taken over by the Government/ Department as per item (ii) above. Provided always that against any payments due to the contractor on this account or otherwise, the Engineer-in-Charge shall be entitled to recover or be credited with any outstanding balances due from the contractor for advance paid in respect of any tool, plants and materials and any other sums which at the date of termination were recoverable by the Government/ Department from the contractor under the terms of the contract.

CLA USE 14- DELETED

CLAUSE 15 -DELETED

CLAUSE 16
ACTION IN CASE WORK NOT DONE AS PER SPECIFICATIONS

All works under or in course of execution or executed in pursuance of the contract, shall at all times be open and accessible to the inspection and supervision of the Engineer-in- charge, his authorized subordinates in charge of the work and all the superior officers, officer of the Quality Assurance unit of the Institute or any organization engaged by the Institute for Quality Assurance and of the Chief Technical Examiner's office and the contractor shall, at all times, during the usual working hours and at all other times at which reasonable notice of the visit of such officers has been given to the contractor, either himself be present to receive orders and instructions or have a responsible agent duly accredited in writing, present for that purpose. Orders given to the contractor's agent shall be considered to have the same force as if they had been given to the contractor himself.

If it shall appear to the Engineer-in-charge or his authorized subordinate in-charge of the work or to the Authority in charge of Quality Assurance or his subordinate officers or the officers of the organization engaged by the Institute for Quality Assurance or to the Chief Technical Examiner or his subordinate officers that any work has been executed with unsound, imperfect, or unskillful workmanship, or with materials or articles provided by him for the execution of the work which are unsound or of a quality inferior to that contracted or otherwise not in accordance with the contract, the contractor shall, on demand in writing which shall be made within twelve months (six months in the case of work costing Rs.10 lakhs and below except road work) of the completion of the work from the Engineer-in- charge specifying the work, materials or articles complained of notwithstanding that the same may

have been passed, certified and paid for forthwith rectify, or remove and reconstruct the work so specified in whole or in part, as the case may require or as the case may be, remove the materials or articles so specified and provide other proper and suitable materials or articles at his own charge and cost. In the event of the failing to do so within a period specified by the Engineer-in-charge in his demand aforesaid, then the contractor shall be liable to pay compensation at the same rate as under clause 2 of the contract (for non- completion of the work in time) for this default.

In such case the Engineer-in-charge may not accept the item of work at the rate applicable under the contract but may accept such items at reduced rates as the authority specified in Schedule `F' may consider reasonable during the preparation, of on account bills or final bill if the item is so acceptable without detriment to the safety and utility of the item and the structure or he may reject the work outright without any payment and/or get it and other connected and incidental items rectified, or removed and re-executed at the risk and cost of the contractor. Decision of the Engineer-in-charge to be conveyed in writing in respect of the same will be final and binding on the contractor.

CLAUSE 16A
NOTICE TO BE GIVEN BEFORE COVERING UP

The Contractor shall give not less than seven days' notice in writing to the Engineer-in- charge or his authorized subordinate in charge of the work before covering up or otherwise placing beyond the reach of measurement any work in order that the same may be measured and correct dimensions thereof be taken before the same is covered up or placed beyond the reach of measurement and shall not cover up and placed beyond the reach of measurement any work without the consent in writing of the Engineer-in-charge or his authorized subordinate in charge of the work shall within the aforesaid period of seven days inspect the work and if any work shall be covered up or placed beyond the reach of measurement without such notice having been given or the Engineer-in-charge's consent be obtained the same shall be uncovered at the Contractor's expense, or in default thereof no payment or allowance shall be made for such work or the materials with which the same was executed.

CLAUSE 17A

CONTRACTOR LIABLE FOR DAMAGES, DEFECTS DURING MAINTENANCE PERIOD

If the Contractor or his working people shall break, deface, injure or destroy any part of a building in which they may be working or any buildings, road, kerbs, fence, enclosure, water pipes, cables, drains, electric and telephone posts or wire, trees, grass or grass land or cultivated ground contiguous to the premises on which the work or any part of it is being executed, or if any damage shall happen to the work while in progress from any cause whatever or if any defects shrinkage or other faults appear in the work within twelve months (6 months in the case of any work other than road work costing Rs,10,00,000/- and below) after a certificate of final or otherwise of its completion shall have been given by the Engineer-in-charge as aforesaid arising out of defective or improper materials or

workmanship, the Contractor shall after receipt of notice in writing in that behalf make the same good at his own expense, or in default the Engineer-in-charge may cause the same to be made good by other workmen and deduct the expense (of which the certificate of the Engineer-in-charge shall be final) from any sums that may then, or at any time thereafter become due to the Contractor, or from his Security Deposit or the proceeds of sale thereof, or of a sufficient portion thereof the Security Deposit of the Contractor shall not be refunded before the expiry of twelve calendar months after the issue of the certificate of final or otherwise of completion of work, or till the final bill has been prepared and passed whichever is later.

Engineer-in-Charge shall give notice to the contractor of any defects before the end of the Defect Liability Period, which begins on the date of completion. The Defect Liability Period shall stand automatically extended for as long as defects remain to be rectified. Every time notice of defect is given, the contractor shall correct the notified defects within the period specified by Engineer-in-charge.

However, for contract exclusively for earth work or jungle clearance where defect liability period is not relevant, Security Deposit if any paid may be refunded along with payment of final bill subject to labour clearance vide Clause 45.

Further in case where the contract provides for completion in phases, the Engineer-in- charge at his discretion may allow part refund of Security Deposit after expiry of 12 months (6 months in case of any works other than road work costing Rs.10,00,000 and below) from the date of completion for each phase but not before the payment of final bill for the entire contract.

CLAUSE 17B

SPECIAL CONDITION ON TAKING INSURANCE POLICY FOR THE WHOLE WORKORDER VALUE BY THE CONTRACTORS'

As per Clause 17A of the Conditions of Contract, the Contractors' have to make good at their own expense the damages occurred due to any accident from any cause during the work in progress or nearing completion of the work. In order to fulfill this clause and also to take the responsibility of handing over the site to the full satisfaction of the Engineer-in-Charge and till the contractor gets the certificate or a letter of taking over the site facility/ building/works, the contractor shall be responsible to re-do the works damaged from any cause. For this purpose, the contractor shall insure the whole work the moment the work order is received and before agreement is signed for the entire work order value under contractor's all risk insurance policy [CAR]. The third-party liability and Cross-liability shall also be covered under the policy. The Contractors shall consult the insurance companies and also the principal employer i.e., the Engineer-in-Charge and take the insurance policy for CAR. In case of any accidents during the work or nearing completion of the work [other than during the defect liability period for which Clause-17A is applicable], the Contractors are totally responsible to re-do the damages and hand over site in acceptable condition to the Engineer-in-Charge and await a letter from the Department that the site has been taken over. Till such time, the Contractors are responsible for all the damages from any cause.

Note: Contractor should also obtain insurance policy to cover all the laborers engaged in the work.

In the event of contractor failing to keep insurance alive, Department reserves right to take appropriate action including withholding the payments due to the Contactor.

CLAUSE 18

CONTRACTOR TO SUPPLY TOOLS AND PLANTS ETC.,

The Contractor shall supply and provide at his own cost all materials (except such special materials, if any as may in accordance with the contract be supplied from the Engineer-in- charge's stores) plant, tools, appliances, implements, ladders, cartage, tackle, scaffolding and temporary works requisite for the proper execution of the work, whether original, altered or substituted and whether included in the specification or other documents forming part of the contract or referred

to in these conditions or not or which may be necessary for the purpose of satisfying or complying

with the requirements of the Engineer-in-charge as to any matters as to which under these conditions he is entitled to be satisfied or which he is entitled to require together with carriage thereof to and from the work.

The Contractor shall also supply without charge the requisite number of persons with the means and materials necessary for the purpose of setting out works and counting, weighing and assisting in the measurement or examination at any time and from time to time of the work or materials failing his so doing the same may be provided by the Engineer-in-charge at the expenses of the Contractor and the expense may be deducted from any money due to the Contractor under the contract or the proceeds of sale thereof or of a sufficient portion thereof.

CLAUSE 18A
RECOVERY OF COMPENSATION PAID TO WORKMEN

In every case which by virtue of the provisions of section 12 sub-section (i) of the workman's compensation act, 1923, Institute is obliged to pay compensation to workmen employed by the Contractor in execution of the work, Institute will recover from the Contractor the amount of the compensation so paid and without prejudice to the rights of Institute under section-12 sub-section (2) of the said act, Institute shall be at liberty to recover such amounts or any part thereof by deducting it from the security Deposit or from any sum due by the Institute to the contract whether under this contract or otherwise, Institute shall not be bound to contest any claim made against it under section 12, sub-section (1) of th- said act except on the written request of the Contractor and upon his giving to Institute full security for all costs for which Institute might become li-ble in Consequence of contesting such claim.

CLAUSE 18B
ENSURING PAYMENT AND AMENITIES TO WORKERS IF CONTRACTOR FAILS

In every case in which by virtue of the provisions of the contract Labour (Regulation and Abolition Act 1970) and of the Contract Labour Regulation and Abolition Central Rules, 1971, Institute is obliged to pay any amounts of wages to workman employed by the Contractor in execution of the works, or to incur any expenditure in providing welfare and health amenities required to be provided under the above said act and the rules under clause 19 or under the rules framed by Institut-

from to time for the protection of health and sanitary arrangements for workers employed by Institute Contractor, Institute will recover from the Contractor the amount of wages so paid or the amount of expenditure so incurred and without prejudice to the right of the Institute under section 20 sub- section (2) and section 21 sub-section (4) ofthe Contract Labour (R&A) act 1970Institute shall be at liberty to recover such amount or any part thereof by d-ducting it from any sum due by the Institute to the contractor whether under this agreement or otherwise Institute shall not be bound to contest any cl-im made against it under section 20 sub-section (1) and section 21 sub section (4) of the said Act except on the written request of the Contractor and upon his giving to the Institute full security for all costs for which Institute might become liable in contesting such claim.

CLAUSE 19
LABOUR LAWS/ SAFETY PROVISIONS TO BE COMPLIED BY THE CONTRACTOR

Contractor shall follow all laws, regulations and acts of Central/ State Government and other statutory bodi-s relating to engaging labourers in work, wages and all related provisions and indemnify Institute against payment to be made under -nd for the observance of the said labour laws.

Engineer-in-Charge concerned shall have the right to deduct from the moneys due to the contractor, -ny sum required or estimated to be required for making good the loss suffered bya worker or workers by reason of non-fulfillment of any of the conditions of the contract for the benefit of the workers, non-payment of wages or of deductions made from his or their wages which are not justified by their terms of the contract or non-observance of the Regulations.

Further, contractor at his own expense shall arrange and comply with the safety provisions as per labor laws and health & sanitary arrangements for the workers as per the extent rules.

CLAUSE 20
MINIMUM WAGES ACT

Contractor shall comply with all the provisions of the Minimum Wages Act 1948, Contract Labour (Regulation and Abolition) act, 1970 and rules framed thereunder and other labour laws affecting Contract Labour that may be brought into force from time to time.

CLAUSE 21

WORK NOT TO BE SUBLET - ACTION IN CASE OF INSOLVANCY

The contract shall not be assigned or sublet without the written approval of the Engineer-in- charge and if the Contractor shall assign or sublet this contract or attempt to do so or become insolvent or commence any insolvency proceedings or make any composition with his creditors or attempt to do so or if any bribe gratuity, gift, loan, perquisite reward or advantage, pecuniary or otherwise shall either directly or indirectly be given, promised or offered by the Contractor or any of his employees or agents to any public officer or person in the employ of the Institute in any way relating to his Officer or Employment, or if any such officer or person shall become in any way directly or indirectly interested in the contract, the Engineer-in- charge may thereupon on behalf of the Director, Raman Research Institute shall have power to adopt any of the course specified in Clause 3 as he may best deem suited in the interest of Institute, in the event of any of those courses being adopted the consequences specified in the said clause 3 shall ensure.

CLAUSE 22

COMPENSATION PAYABLE ARE WITHOUT REFERNCE TO ACTUAL LOSS OR DAMAGES

All sums payable by way of compensation under any of these conditions shall be considered as reasonable compensation to be applied to the use of Institute without reference to the actual loss or damage sustained and whether or not any damage shall have been sustained.

CLAUSE 23

CHANGE IN FIRM'S CONSTITUTION TO BE INTIMATED.

Where the Contractor is a partnership firm, the previous approval in writing of the Engineer-in- charge shall be obtained before any change is made in the constitution of the firm. Where the Contractor is an individual or a Hindu undivided family business concern such approval as aforesaid shall likewise be obtained before the Contractor enters into any partnership agreement where under the partnership firm would have the right to carry out the work hereby undertaken by the Contractor. If previous approval as aforesaid is not obtained, the contractor shall be deemed to have been assigned in contravention of clause 21 hereof and the same action may be taken and the same consequences shall ensure as provided in the said clause 21.

CLAUSE 24 - DELETED

CLAUSE 25

SETTLEMENT OF DISPUTES AND ARBITRATION

a) If any dispute or differences of any kind whatsoever were to arise between the Engineer-in-charge, RRI and the Contractor regarding the following matters namely.

i) The meaning of the specifications, designs, drawings and instructions herein before mentioned.

ii) The quality of workmanship or materials used on the work and

iii) Any other question, claim, right, matters, thing whatsoever in any way arising out of or relating to the contract, designs, drawings, specifications, estimates, instructions or orders, or those conditions or failure to execute the same whether arising during the progress of the work after the completion, termination or abandonment thereof, the dispute shall, in the first place be referred to the Administrative Officer, RRI who has Jurisdiction over the work specified in the contract with the details of claims, justification for the same with supporting documents such as analysis of rates, cash vouchers and other relevant particulars. The Administrative Officer, RRI shall within a period of sixty days from the date of being requested by the Contractor to do so or from the date of furnishing of required particulars whichever is later shall give written notice of his decision to the contractor.

If the Administrative Officer, RRI fails to give notice of his decision within a period of 60 days from the date of receipt of (i) the Contractor's request in writing for settlement of dispute or difference as aforesaid or (ii) relevant particulars from the Contractor in support of his claims whichever is later. (OR)

If the decision of the Administrative Officer, RRI is not acceptable to the Contractor, he may approach the Director of RRI within a period of 15 days from the date of expiry of 60 days specified above. The Director of RRI shall within a period of further 90 days from the date of receipt of request from the contractor or from the date of receipt of relevant particulars from the contractor in support of claims whichever is later give notice of his decision (s) to the Contractor.

b) Subject to other forms of settlement hereinafter provided the Director of RRI decision in respect of every dispute or difference so referred shall

be final and binding upon the Contractor. The said decision shall forthwith be given effect to and Contractor shall proceed with the execution of the work with all due diligence.

c) Remedy

1. When Director of RRI decision is not acceptable to Contractor OR
2. Director of RRI fails to give decision within 90 days.

In case the decision of the Director of RRI is not acceptable to the Contractor or Director of RRI fails to give decision within 90 days specified above, the Contractor may approach the Law court specified in Schedule 'F' for settlement of dispute aftergiving due written notice in this regard to the Director of RRI.

d) Whether the claim is referred to the Administrative Officer, RRI/ Director of RRI or to the Law Courts, as the case may be, the Contractor shall proceed to execute andcomplete the works with all due diligence pending settlement of the said dispute or differences.

Obligations of the Engineer-in-charge and Contractor shall remain unsettled during considerations of dispute.

e) The reference of any dispute or dispute (s) or difference(s) to Administrative Officer,RRI or the Director of RRI or the Law Court may proceed not withstanding that the work shall then be or be alleged to be complete provided always that the obligations of the Engineer-in-charge and the Contractor shall not be altered by reason of the said dispute or difference being referred to Administrative Officer, RRI/ Director of RRI or the Law Court during the progress of the works.

CLAUSE 25A- DELETED

CLAUSE 26

PATENT RIGHTS

The Contractor shall fully indemnify the President of India against any action, claim or proceeding relating to infringement or use of any patent or design on any alleged patent or design right and shall pay any royalties which may be payable in respect of any article or part thereof included in the contract. In the event of any claims made under or action brought against Government in respect of such matters as aforesaid the Contractor shall be immediately notified thereof and the Contractor shall be at liberty, at his own expense, to settle any dispute or to conduct any

litigation that may arise there from. Provided that the Contractor shall not be liable to indemnify the President of India if the infringement of th· patent or design of any alleged patent or design right is the direct result of an order passed by the Engineer-in-charge in this behalf.

CLAUSE 27 – DELETED

CLAUSE 28 – RENUMBERED AS CLAUSE 11A

CLAUSE 29

WITHHOLDING AND LIEN IN RESPECT OF SUMS DUE FROM CONTRACTOR

(i) Whenever any claim or claims for payment of a sum of money arises out of or under the contract or against the contractor, the Engineer-in-Charge or the Institute shall beentitled to withhold and also have a lien to retain such sum or sums in whole or in part from the security, if any deposited by the contractor and for the purpose af•resaid, the Engineer-in-Charge or the Institute shall be entitled to withhold the security deposit, if any, furnished as the case may be and also have a lien over the same pending finalization or adjudication of any such claim. In the event of the security being insufficient to cover the claimed amount or amounts or if no security has been taken from the contractor, the Engineer-in-Charge or the Institute shall be entitled towithhold and have a lien to retain to the extent of such claimed amount or amounts referred to above, from any sum or sums found payable or which may at any time thereafter become payable to the contractor under the same contract or any other contract with the Engineer-in-Charge of the Institute or any contracting person through the Engineer- in-Charge pending finalization of adjudication of any such claim.

It is an agreed term of the contr·ct that the sum of money or moneys so withheld retained under the lien referred to above by the Engineer-in-charge or Institute will bekept withheld or retained as such by the Engineer-in-charge or Institute till the claim arising out of or under the contract is determined by the competent court and that the contractor will have no claim for interest or damages whatsoever on any account in respect of such withholding or retention under the lien referred to above and duly Notified as such to the contractor. For the purpose of this clause, where the contractor is a partnership firm or a limited c•mpany, the Engineer-

in-charge or the Institute shall be entitled to withhold and also have a lien to retain towards such claimed amount or amounts in whole or in part from any sum found payable to any partner/limited company at the case may be, whether in his individual capacity or otherwise.

(ii) Institute shall have the right to cause an audit and Technical Examination of the work and the final bills of the Contractor including all supporting vouchers abstract etc., to be made after payment of the final bill and if as a result of such audit and Technical Examination any sum is found to have been over paid in respect of any work done by the Contractor under the contract or any work claimed by him to have been done by him under contract and found not to have been executed, the Contractor shall be liable to refund the amount of over payment and it shall be lawful for Institute to recover the same from him in the manner prescribed in sub clause (1) of this clause or in any other manner equally permissible and if it is found that the Contractor was paid less than what was due to him under the Contract in respect of any work executed by him under it, the amount of such under payment shall be duly paid by Institute to the contractor, without any interest thereon whatsoever.

Provided that the Institute shall not be entitled to recover any sum overpaid, nor the contractor shall be entitled to payment of any sum paid short where such payment has been agreed upon between the Engineer-in-Charge on the one hand and the contractor on the other under any term of the contract permitting payment for work after assessment by the Engineer in Charge.

CLAUSE 29A

LIEN IN RESPECT OF CLAIMS IN OTHER CONTRACTS

Any sum of money due and payable to the Contractor (including Security Deposit returnable to him) under the contract may be withheld or retained by way of lien by the Engineer-in- charge or the Institute or any other contracting person or persons through Engineer-in-charge against any claim of the Engineer-in-charge or the Institute or such other person or persons in respect of payment of a sum of money arising out of or under any other contract made by the Contractor with the Engineer in charge or Institute or with such other person or persons.

It is an agreed term of the contract that the sum of the money so withheld or retained under this clause by the Engineer-in-charge or the Institute will be kept withheld or retained as such by the Engineer-in-charge or the Institute or till his claim arising out of the same contract or any other contract is either mutually settled or determined by the competent court, as the

case may be and that the contractor shall have no claim for interest or d-mages whatsoever on this account or on any other ground in respect of any sum of money withheld or retained under this clause and duly notified as such to the contractor.

CLAUSE 30

TERMINATION OF CONTRACT ON DEATH OF THE CONTRACTOR

Without prejudice to any of the rights or remedies under this contract, if the Contractor dies, the Engineer-in-charge on behalf of the Director, Raman Research Institute shall have the option of terminating the contract without compensation to the Contractor.

CLAUSE 31 WATER SUPPLY

The contractor(s) shall make his/their own arrangements for water required for the workand nothing extra will be paid for the same. This will be subject to the following conditions.

i) That the water used by the contractor(s) shall b- fit for construction purposes to the satisfaction of the Engineer-in-Charge.

ii) The Engineer-in-Charge shall make alternative arrangements for supply of water at the risk and cost of contractor(s) if the arrangements made by the contractor(s) for procurement of water are in the opinion of the Engineer-in- Charge, unsatisfactory.

Institute Supply, if available:

Water, if available and separable, may be supplied to the contractor by Institute only at the single point subject to the following conditions: -

i) The water charges @ 1% shall be recovered on gross amount of the work done.

ii) The contractor(s) shall make his/their own arrangement of water connection and laying of pipelines from existing main of source of

supply.

iii) The Institute do not guarantee to maintain uninterrupted supply of water and it will be incumbent on the contractor(s) to make alternative arrangements for water at his/their own cost in the event of any temporary break down in the Institute water main so that the progress of his/their work is not held up for want of water. No claim of damage or refund of water charges will be entertained on account of such break down.

Alternative water arrangements:

i) Where there is no piped water supply arrangement and the water is taken by the Contractor from the wells or hand pump constructed by the Institute no charge shall be recovered from the Contractor on that account. The Contractor shall, however, draw water at such hours of the day that it does not interfere with the normal use for which the hand pump and wells are intended. He will also be responsible for all damage and abnormal repairs arising out of his use, the cost of which shall be recoverable from him. The Engineer-in-charge shall be the final authority to determine the cost recoverable from the Contractor on this account.

ii) The Contractor shall be allowed to construct temporary wells in Institute land for taking water for construction purposes only after he has got permission of the Engineer-in- charge in writing. No charges shall be recovered from the Contractor on this account, but the Contractor shall be required to provide necessary safety arrangements to avoid any accidents or damage to adjacent buildings, roads and service lines. He shall also be responsible, for any accidents or damage caused due to construction and subsequent maintenance of the wells and shall restore the ground to its original condition after the wells are dismantled on completion of the work.

CLAUSE 32 ELECTRICITY

Electricity, if available in the premises and separable, may be provided to the contractor by Institute only at the single point subject to the following conditions: -

i) The Contractor has to make his own arrangement to tap Electricity from a 3 phase/ single phase supply from location decided by Engineer-in-charge. Electricity supply will be made available only on metered basis. Electric charges will be recovered at actuals.

ii) In all cases where/when the energy meter is not installed,

defective energy meter is not replaced or not rectified immediately, the consumption charges towards electricity will be recovered on the basis of the total wattage of the load multiplied by the number of hours utilized. In all such cases the Contractor shall maintain a log book indicating wattage of the load and hours of consumption and get the same attested by Engineer- in-charge at appropriate time without fail. The decision of Engineer-in-charge in the matter shall be final.

Note: Please refer Guide lines for temporary power supply at site and general safety procedures, attached.

CLAUSE 33

RETURN OF INSTITUTE SURPLUS MATERIALS TO INSTITUTE

Not with standing anything contained to the contrary in any or all the clauses of this contract where any materials for the execution of the contract are procured with the assistance of Government either by issue from Government stocks or purchase under orders made or permits or licenses issued by the Government the Contractor shall hold the said material as trustee for Government and use such materials economically and solely for the purpose of the contract and not dispose of them without the permission of the Government and return, if required by Engineer-in-charge all surplus, serviceable materials that may be left with him after the completion of the contract or at its termination for any reason whatsoever on being paid or credited such price as the Engineer-in-charge shall determine having due regard to the condition of the material. The price allowed to the Contractor, however, shall not exceed the amount charged to him excluding the storage charges, if any. The contractor shall also not be entitled to cartage and incidental charges for returning the surplus materials from and to the stores where from they were issued. The decision of Engineer-in-charge shall be final and conclusive.

In the event of breach of aforesaid conditions, the contractor shall in addition to throwing himself open to action for contravention of the terms of licenses or permits and/or for criminal breach of trust, be liable to compensate the Government for all moneys, advantages or profits resulting or which in the usual course would have resulted to him by reason of such breach.

CLAUSE 34 – DELETED

CLAUSE 35 - DELETED

CLAUSE 36

EMPLOYMENT OF GRADUATE/ DIPLOMA ENGINEERS

Contractors Superintendence, Supervision, Technical Staff & Employees

(i) The contractor shall provide all necessary superintendence during execution of the work and all along thereafter as may be necessary for proper fulfilling of the obligations under the contract.

The contractor shall immediately after receiving letter of acceptance of the tender and before commencement of the work, intimate in writing to the Engineer-in-Charge, the name(s), qualifications, experience, age, address(s) and other particulars along with certificates, of the principal technical representative to be in charge of the work and other technical representative(s) who will be supervising the work. Minimum requirement of such technical representative(s) and their qualifications and experience shall not be lower than specified in Schedule 'F'. The Engineer-in-Charge shall within 3 days of receipt of such communication intimate in writing his approval or otherwise of such a representative(s) to the contractor. Any such approval may at any time be withdrawn and in case of such withdrawal, the contractor shall appoint another such representative(s) according to the provisions of this clause. Decision of the tender accepting authority shall be final and binding on the contractor in this respect. Such a principal technical representative andother technical representative(s) shall be appointed by the contractor soon after receipt of the approval from Engineer-in-charge and shall be available at site before start of work.

All the provisions applicable to the principal technical representative under the Clause will also be applicable to other technical representative(s). The principal technical representative and other technical representative (s) shall be present at the site of work for supervision at all times when any construction activity is in progress and also present himself/themselves, as required, to the Engineer-in-Charge and/or his designated representative to take instructions. Instructions given to the principal technical representative or other technical representativ-(s) shall be deemed to have the same force as if these have been given to the contractor. The principal technical representative and other technic-l representative(s) shall be actually available the decision of the Engineer-in- Charge as recorded in the site

order book and measurement recorded checked/test checked in Measurement Books shall be final and binding on the contractor.

Further if the contractor fails to appoint suitable technical Principal technical representative and/or other technical representative(s) and if such appointed persons are not effectively present or are absent by more than two days without duly approved substitute or do not discharge their responsibilities satisfactorily, the Engineer-in-Charge shall have full powers to suspend the execution of the work until such date as suitable other technical representative(s) is/are appointed and the contractor shall be held responsible for the delay so caused to the work. The contractor shall submit a certificate of employment of the technical representative(s) along with every on account bill/ final bill and shall produce evidence if at any time so required by the Engineer-in-Charge at site fully during all stages of execution of work, during recording/checking/ test checking of measurements of works and whenever so required by the Engineer-in-Charge and shall also note down instructions conveyed by the Engineer-in- Charge or his designated representative(s) in the site order book and shall affix his/ their signature in token of noting down the instructions and in token of acceptance of measurements/ checked measurements/test checked measurements. The representative(s) shall not look after any other work. Substitutes, duly approved by Engineer-in-Charge of the work in similar manner as aforesaid shall be provided in event of absence of any of the representative(s) by more than two days.

If the Engineer-in-Charge, whose decision in this respect is final and binding on the contractor, is convinced that no such technical representative(s) is/are effectively appointed or is/are effectively attending or fulfilling the provision of this clause, a recovery (non-refundable) shall be affected from the contractor as specified in Schedule 'F' and

(ii) The contractor shall provide and employ on the site only such technical assistants as are skilled and experienced in their respective fields and such foremen and supervisory staff as are competent to give proper supervision to the work.

The contractor shall provide and employ skilled, semiskilled and unskilled labour as is necessary for proper and timely execution of the work.

The Engineer-in-Charge shall be at liberty to object to and require the contractor to remove from the works any person who in his opinion misconducts himself, or is incompetent or negligent in the performance of his duties or whose employment is otherwise considered by the Engineer-in-Charge to be undesirable. Such person shall not be employed again at works site without the written permission of the Engineer-in-Charge and the persons so removed

shall be replaced as soon as possible by competent substitutes.

CLAUSE 37 - DELETED CLAUSE 38 - DELETED CLAUSE 38A - DELETED

CLAUSE 39

RELATIVE WORKING WITH INSTITUTE

It is presumed that the Contractor is not related to any of the officers of the Institute. If he has any such relatives' full particulars of the same should be furnished.

CLAUSE 40

RESTRICTION FOR EMPLOYING RETIRED GOVERNMENT SERVANT

No Engineer of Gazetted rank or other Gazetted officer employed in Engineering or Administrative duties in the Engineering Institute of the Government of India shall work as a Contractor or employ of contractor for a period of one year after his retirement from Government service without the previous permission of Government of India in writing. This contract is liable to be cancelled if either the Contractor or any of his employees is found at any time to be such a person who had not obtained the permission of Government of India as aforesaid before submission of the tender or engagement in the Contractor's service as the case may be.

CLAUSE 41

RETURN OF MATERIALS & RECOVERY FOR EXCESS MATERIAL ISSUED

i) After completion of the work and also at any intermediate stage in the event of non- reconciliation of materials issued, consumed and in balance - (see Clause 10), theoretical quantity of materials issued by the Government for use in the work shall be calculated on the basis and method given hereunder: -

a. Quantity of cement & bitumen shall be calculated on the basis of quantity of cement & bitumen required for different items of work as shown in the Schedule of Rates mentioned in Schedule 'F'. In case any item is executed for which standard constants for the consumption of cement or bitumen are not available in the above-mentioned schedule/statement or cannot be derived from the same

shall be calculated on the basis of standard formula to be laid down by the Engineer-in-Charge.

b. Theoretical quantity of steel reinforcement or structural steel sections shall be taken as the quantity required as per design or as authorized by Engineer-in- Charge, including authorized lappages, chairs etc. plus 5% wastage due to cutting into pieces, such theoretical quantity being determined and compared with the actual issues each diameter wise, section wise and category wise separately.

c. Theoretical quantity of G.I. & C.I. or other pipes, conduits, wires and cables, •ig lead and G.I./M.S. sheets shall be taken as quantity actually required and measured plus 5% for wastage due to cutting into pieces (except in the case of G.I./M.S. sheets it shall be 10%), such determination & comparison being made diameter wise & category wise.

d. For any other material as per actual requirements.

ii) Over the theoretical quantities of materials so computed a variation shall be allowed as specified in Schedule 'F'. The difference in the net quantities of material actually issued to the contractor and the theoretical quantities including such authorized vari-tion, if not returned by the contractor or if not fully reconciled to the satisfaction of the Engineer-in- Charge, within fifteen days of the issue of writt-n notice by the Engineer-in-charge to this effect shall be recovered at the rates specified in Schedule 'F', without prejudice to the provision of the relevant conditions regarding return of materials governing the contract. Decision of Engineer-in-Charge in regard to theoretical quantities of materials, which should have been actually used as per the Annexure of the standard schedule of rates and recovery at rates specified in Schedule 'F', shall be final & binding on the contractor.

For non-scheduled items, the decision of the Engineer-in-Charge regarding theoretical quantities of materials which should have been actually used, shall be final and binding on the contractor.

iii) The said action under this clause is without prejudice to the right of the Government/Department to take action against the contractor under any other conditions of contract for not doing the work according to the prescribed specifications.

CLAUSE 42 – DELETED

CLAUSE 43

APPRENTICE ACT TO BE COMPLIED WITH

The Contractor shall comply with the provisions of the Apprentices Act 1961 and the rules and orders issued there under from time to time. If he fails to do so his failure will be a breach of the contract and the Engineer-in-charge may in his discretion cancel th· contract. The Contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provisions of the Act.

CLAUSE 44 – DELETED

CLAUSE 45

RELEASE OF SECURITY DEPOSIT AFTER LABOUR CLEARANCE

Security Deposit of the work shall not be refunded till the contractor produces a clearance certificate from the Labour officer. As soon as the work is virtually complete the contractor shall apply for the clearance certificate to the L·bour officer under intimation to the Engineer- in- charge. The Engineer-in-charge, on receipt of the said communication, shall write to the Labour officer to intimate if any complaint, its pending against the contractor in respect of the work. If no complaint is pending, on record till after 3 months after completion of the work and/or no communication is received from the Labour officer to this effect till six months after the date of completion, it will be deemed to have received the clearance certificate and the Security Deposit will be released if otherwise due.

C. GENERAL GUIDELINES

(TO BE READ IN CONJUNCTION WITH THE GENERAL CONDITIONS OF CONTRACT (GCC))

1. MARKING BASE LINES AND LEVELS

The Contractor shall layout his work from base lines and grades established by the Department, and shall be responsible for all measurement in connection therewith. The Contractor shall at his own expense furnish all stakes, template, platforms, equipment, ranges and labour that may be required in setting or laying out any part of the work, the Contractor shall be held responsible for the proper execution of the work to such lines and grades as may be established or indicated on the drawings and specifications. The Contractor shall check the bench marks and benches existing at the site for laying out lines and levels. The Contractor is to construct and maintain proper benches at the intersections of all main walls, in order that the lines and levels may be accurately checked at all times. The Contractor shall provide suitable stones with flat tops and built the same in concrete for temporary bench marks. All the pegs for setting out the works and fixing the necessary levels required for the execution thereof shall, if desired by the Engineer-in-charge, likewise to built in masonry at such places and in such mortar as the Engineer-in-charge may determine. Theodolite, levels, prismatic compass, chain, steel and metallic tapes and all other surveying instruments found necessary on the works shall be provided by the Contractor for their own use and for inspection by Departmental officers.

2. STORES & MATERIALS, INSPECTION AND AVOIDING INCONVENIENCE TOINSTITUTES ACTIVITIES

Stores and material required for the work are to be stored by the Contractors only in places to be indicated by Engineer-in-charge. The Engineer-in-charge shall have the right at any time to inspect and examine any store and materials intended to be used in or on the works on the site or at any factory or workshop or other places where such stores or materials are being constructed or manufactured or processed or any place from where they are being obtained and the Contractor shall give such facilities as required to be given for such inspection and examination.

The Engineer-in-charge shall be entitled to have tests made at any approved Laboratory for any stores and/or materials supplied by the Contractor who shall provide at his own expense all facilities (viz.,) arrangements required for taking samples, conveyance, packing, etc., which the Engineer-in-charge may require for the purpose. Testing charges shall be borne by the Institute.

Any stores and materials brought to the site for use on the work shall not be removed off the site without prior written approval of the Engineer-in-charge, but on final completion of the work Contractor shall at his own

expense remove from the site all surplus stores and materials originally brought by him.

The Contractor shall not deposit materials on any site which will cause inconvenience to any of the Institutional activities. The Contractor shall undertake to clean the site free from rubbish to the satisfaction of the Engineer-in-charge. All surplus materials, rubbish and materials which may be dangerous/ cause inconvenience to the activities of the Institute shall be removed at the Contractor's cost and deposited at the places fixed by EIC.

3. SPECIFICATIONS AND DRAWINGS

The drawings furnished to the Contractor shall be interpreted and identified by figured dimensions and nomenclature as indicated therein. On no occasion the drawings shall be scaled off and transferred to work.

In all cases where enlarged detailed drawings are given for any component of work, these drawings shall take precedence over those incorporated in general drawing to a comparatively smaller scale.

a) Prior to the execution of the work, the contractor shall check all drawings, specifications and shall immediately report all errors, discrepancies and/or omissions discovered ther·in to the Engineer-in-charge and obtain appropriate orders on the same. Any adjustment made by the Contractor without prior approval of the Engineer- in-charge shall be at his own risk, each description of item in the schedule of quantities shall be read in injunction with the relevant drawings and the specifications and the Contractor's rate shall be deemed to be for such complete work unless otherwise specified by the Contractor while tendering.

b) Cost of all shop drawings, fabrication drawings or form work drawings and details to be furnished by the Contractor shall be deemed to be included in his tendered rates for the work. Accordingly, approval to shop drawings or other fabrication drawings

shall not be construe• as authorizing award of additional work and as long as these belong to common individual scheme governed by specifications for which the Contractor has already quoted, no extra payment on any account will be admissible for all essential components that are to be necessarily executed to complete the work in all respects.

c) Prior to submission for approval, Contractor shall be responsible for thoroughly checking all drawings to ensure that they comply with the intent & requirements of contract specifications & that they fit with the overall building layout. Drawing found to be inaccurate/ in error will be returned for correction by the Contractor.

d) For all drawings to be submitted by the Contractor for the approval of the Engineer- in-charge, the Contractor shall submit 2 (two) copies of each drawing for approval.

e) The approval of drawing by the Engineer-in-charge shall not be construed as a complete dimensional check, but will indicate only that the general method of construction and detailing is satisfactory. The contractor shall be totally responsible for the dimensions and design, safety of the system evolved inclusive of providing interconnected operational accessories adequate enough to accomplish satisfactory completion of work.

f) In case of difference between drawings and specifications, the specifications shall govern. Anything mentioned in the specification and not shown in the drawings or shown on the drawings but not mentioned in the specifications shall be like effect as if shown or mentioned in both.

4. SEQUENCE OF WORK

The sequence of work shall be generally as decided by the Engineer-in-charge taking into consideration other connected works.

5. CO-ORDINATION WITH OTHER CONTRACTORS

Contractor shall extend all co-operation to the other Contractors executing the work, who might be working at the site.

6. INSPECTION OF WORK

The work shall be carried out under the directions of the Engineer-in-charge in addition subject to inspection by the representative appointed by Engineer-in-charge to ensure strict compliance with the terms, specifications and conditions of th- contract. Any failure on the part of the Engineer-in-charge or his representative during the progress of inspection of work to discover any defective work or to reject materials not up to standards shall not be deemed to have been accepted and should not be construed as waived. Any defects noticed either during the period of construction or after the completion up to a period of 12 months (6 months in the case of any work other than roadwork costing Rs.10,00,000/- and below) from the date of completion, the Contractor is liable to carry out all repairs/rectifications at his/ their own cost to the satisfaction of the Institute. Further in the event of the Contractor using substandard/inferior quality of materials which at future date is not susceptible to replacement, for structural reasons or otherwise and if concurrence is given for retention of such structure, the Engineer-in-

charge will have necessary authority to recover a proportionate sum decided as per his discretion. In case the structure with the use of substandard or inferior material cannot be retained in the

work as per the opinion of the Engineer-in-charge, portion or portions of such structure/work shall be dismantled and replaced new by the Contractor at his own cost. Partial or entire occupancy of the premises shall not be construed as the acceptance of the work or materials incorporates in the work. No changes whatsoever to any provision of the specification shall be made without written authorized from the Engineer-in-charge.

7. MEASUREMENT

Where mode of measurement is not specified the measurements will be taken at site as per latest IS code of practice for measurements. The Contractor or his representative shall accompany the Engineer-in-charge or his representative when required to do so and assist in taking the measurement and shall agree to the measurements recorded on the spot. The measurements for all works in general shall be measured as per the dimensions.

All measurements shall be taken with steel tapes only. Necessary scaffolding, st-ging and ladders required for taking measurements shall be provided by Contractor at his cost, besides offering service of labourers for taking such measurements.

If the Contractor fails to accompany the Engineer-in-charge or other persons who have been duly authorized by the Engineer-in-charge to take measurements then he should be bound by the Measurements recorded by the Engineer-in-charge or his representative.

8. MAKE AND OTHER DETAILS OF MATERIALS

The Contractor shall furnish a list of the makes and other details of various materials he proposes to use on th- work and this would be subject to the approval of Institute.

9. SAMPLES

Samples of all materials to be incorporated in the work shall be submitted to the Engineer- in-charge for his approval without claiming any extra cost. The approved samples will be kept with the Engineer-in-charge till the completion of work. Materials not conforming strictly to the samples are liable to be rejected.

10. NO DAMAGE TO INSTITUTE PROPERTY

No damage should be done to the property of the Institute to the buildings or trees and if any damage so done, the Contractor is responsible for making good the loss according to the decision taken by the Engineer-in-charge.

11. SAFETY PROVISIONS/ CONTRACTOR TO BEAR THE EXPENSES INACONNECTION WITH ACCIDENTS, IF ANY

The Contractor shall provide all necessary fencing lights required to protect the public from accident and shall be bound to bear the expenses of defence of every suit, action or other proceedings which may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and costs which may be awarded in any such actions or proceedings to any such persons or which may with the consent of the Contractor be paid to compromise-any claim by any such person.

12. SECURITY REGULATIONS TO BE FOLLOWED

The Contractor have to follow strictly the regulations of the Institute at the work site regarding entry of personnel, materials etc. and any other regulation that might be

enforced from time to time. Contractors personnel/ workers should possess valid passes and should produce the passes to Security/Institute authorities when demanded. Contractor's personnel/workers should not enter the Institute premises, other than those for which the passes are issued and also should not enter after/before working hours without obtaining prior approvals. Any person found in the Institute premises without authorized passes during, before or after working hours is liable for actions as per the Institute procedures and rules.

All materials and articles brought by the Contractor to the work site shall have to be declared at the security gate. Similarly, no materials shall be taken out from the Institute premises without proper gate pass which will be issued/ caused to be issued by the Engineer-in- charge to the Contractor on written request. It is to be noted that loading of Contractor materials in vehicles and truck shall be done in the presence of Institute personnel. The Contractors representative will have to escort the material still the security check is over.

For working on Sundays, Holidays and late hours, even though permission will be accorded by the Engineer-in-charge the Contractor will have to

make application to the Security Institute also and keep them informed well in advance.

Any breach of above security regulations and rules in force from time to time willbe viewed seriously. No claim whatsoever will be entertained by the Institute on account of observance of Security Regulations.

13. SECURITY REGULATIONS TO BE FOLLOWED

The Contractor have to follow strictly the regulations of the Department at the work site regarding entry of p·rsonnel, materials etc. and any other regulation that might be enforced from time to time. Contractors personnel/ workers should possess valid passes and should produce the passes to Security/Department authorities when demanded. Contractors personnel/workers should not enter the Departmental premises, other than those for which the passes are issued and also should not enter after/before working hours without obtaining prior approvals. Any person found in the Departmental premises without authorized passes during, before or after working hours is liable for actions as per the Departmental procedures and rules.

All materials and articles brought by the Contractor to the work site shall have to be declared at the security gate. Similarly, no materials shall be taken out from the Departmental premises without proper gate pass which will be issued/ caused to be issued by the Engineer-in-charge to the Contractor on written request. It is to be noted that loading of Contractor materials in vehicles and truck shall be done in the presence of Departmental personnel. The Contractors representative will have to escort the materialstill the security check is over.

For working on Sundays, Holidays and late hours, even though permission will beaccorded by the Engineer-in-charge the Contractor will hav· to make application to the Security Department also and keep them informed well in advance.

Any breach of above security regulations and rul·s in force from time to time will be viewed seriously. No claim whatsoever will be entertained by the Department on account of observance of Security Regulations.

14. SUBCONTRACTING

Subcontracting as a matter of rule not allowed.

However, if it is inevitable in special cases, the Contractor shall within fifteen (15) days after the date of award of this contract notify the Engineer-in-charge in writing of the names of all Sub-Contractor proposed for the work and the extent and character of the

work to be done by each. The employment of any Sub-Contractor will be

subjected to the approval of the Engineer-in-charge. If for any reason, at any time during the progress of work the Engineer-in-charge determines that any Sub –Contractor is incompetent or undesirable he will notify the Contractor accordingly and the Contractor shall take steps immediately to cancel such Sub-Contractor. Sub-letting by such contract shall be subjected to same regulations. Nothing contained in this contract shall create any contractual relation between any Sub-Contractor and the Department and the Contractor shall be entirely responsible for all the work included in the contract whether executed by him or through his Sub-Contractors. In particular it may be noted that the Contractor shall obtain steel doors and windows from a reputed manufacturer and before placing order for these, the Contractor shall obtain the concurrence of the Department for the agency from whom he proposes to obtain steel doors and windows.

15. ANALYSIS OF RATES QUOTED

The contractor when called for by the Institute should furnish detailed analysis in support of the rates quoted by him against each item of the tender. The Institute reserves the right to utilize the analysis thus supplied in settling any deviations or claims arising on this contract.

An allowance of 15% towards Contractors overheads and profits will be considered while determining the rate/rates on the costs of prevailing market rates as per clause 12 of general conditions of the contract.

16. POWER OF ATTORNEY HOLDERS NOT TO BE PERMITTED FOR EXECUTION OF WORKS.

It may be noted that the original Contractors on whom the work order is issued only shall carry out the work directly and they will not give any power of attorney for execution of the work for anyone else. As a special case, in case of partnership firm, one of the partners can carry out the work with due authorization, provided the partnership deed is to be submitted to the Department. Similarly, in case of a Construction Company, Private Limited Company, Public Limited Company only the authorized signatory of the Company shall act and carry out the work. All such proposals must be made clear by the tenderer while submitting the tender itself and get it specifically approved by the Department. In case, during the execution if the Engineer-in-charge feels that the authorized signatory/ authorized representative is not able to manage works, the authorized signatory/representative can be removed by the Engineer-in-charge.

17. PUBLICITY OF WORKS EXECUTED FOR RRI

The Contractor / Sub-Contractor shall obtain prior written permission of the Department whenever they propose to mention the work executed or being executed for the Department in any of their publicity literature advertisements. The text of the publicity literature advertisement should be submitted while applying for permission.

18. NO INTEREST FOR DELAYED PAYMENTS

Wherever the time limits are specified in the General Conditions of Contract and other parts of the Contract, for payments and releasing of bank guarantee etc., by Department,Department will not pay any interest for delay, if any, beyond the stipulated time limits, caused due to unavoidable official reasons.

D. SCHEDULES

SCHEDULE `A' - SCHEDULE OF QUANTITIES (PRICE SCHEDULE SEPARATELY ATTACHED)

General notes:

Rates for various items of work in the accompanying schedule of quantities for **"Supply, Installation, Testing and Commissioning (SITC) of Air Handling Units (AHUs) with VRF/VRV System including all Allied HVAC works suitable for class 100000 clean room conditions for LASE Lab at RRI Campus, Bengaluru"** shall be quoted after taking into account of the following notes.

1. This is an indivisible works contract. The rates quoted shall include all taxes and levies payable under respective statues etc., as applicable will be deducted as per statues from the bill and remitted to the Institute concerned.
2. Being an indivisible Government Works contract GST is applicable, unless specifically mentioned.
3. The rate quoted shall abide all the provisions mentioned in General Conditions of Contract (GCC) and other general guidelines mentioned in this tender.
4. The rates for various items of works in the Schedule of quantities shall be quoted taking into account the cost of materials, labour, tools and plants, scaffolding, necessary wastages, cost of handling and conveyance of materials to place of work, over heads and profits and any other incidentals included therein.
5. Rates quoted by the Tenderers for various items of work shall be deemed to be inclusive of such leads and lifts mentioned therein and/or as shown in the accompanying tender drawings. Where such information is absent, the rates shall be deemed to be inclusive of the necessary leads and lifts to complete the item of work occurring at any height and with any required leads.
6. The rates quoted shall be in decimal coinage.
7. Rates quoted by the tenderer/ contractor in item rate tender in figures and words shall be accurately filled in so that there is no discrepancy in the rates written in figures and words. However, if a discrepancy is found, the rates which correspond with the amount worked out by the Contractor shall be taken as correct.
8. If the amount of an item is not worked out by the Contractor or it does not correspond with the rate written either in figures or words, then the rate quoted by the Contractor in words shall be taken as correct.

9. Where the rates quoted by the contractor in figures and in words tally but the amount is not worked out correctly the rate quoted by the Contractor will be taken as correct and not the amount.

10. In the event no rate has been quoted for any item(s), leaving space both in figure(s), word(s), and amount blank, it will be presumed that the contractor has included the cost of this/ these item(s) in other item(s). The rate for such item(s) will be considered as ZERO. The work will be required to be executed as specified.

11. In the 'Item of work/ description of work' column 'unit' column, the various abbreviations shall mean as below.

    a. M/m/Rm/Mtr/MTR shall mean 'Metre' in length or breadth or depth.

    b. SQM/Sqm/SM/sqm/M^2/m^2 shall mean 'Square Metre' in area

    c. Cu.m/cu.m/Cum/M^3/m^3 shall mean 'Cubic Metre' in volume.

    d. Kg/kg/KG shall mean 'Kilogram' in weight.

    e. MT/mT/Mt/T shall mean 'Metric Tonne' in weight

    f. Cm/CM/cm shall mean 'Centimetre'

12. After duly filing the rates and amount, this price schedule shall be put in a cover super-scribed with 'Price Bid' and also the name of the work, NIT number and name of tenderer.

Signature of Tenderer
with Name and legal
address

Date:

(PRICE SCHEDULE SEPARATELY

ATTACHED)

SCHEDULE `F' - REFERENCE TO GENERAL CONDITIONS OF CONTRACT

Name of work: "Supply, Installation, Testing and Commissioning (SITC) of Air Handling Units (AHUs) with VRF/VRV System including all Allied HVAC works suitable for class 100000 clean room conditions for LASE Lab at RRI Campus, Bengaluru".

1.	Estimated cost of work	Rs. 1.20 Crores Inclusive of prevailing GST.
2.	Earnest Money	Rs. 2,40,000/-
3.	Performance Guarantee	5% of Work Order amount
4.	Security Deposit	5% of Work Order amount

General Rules & Direction:

1.	Officer inviting Tender	Administrative Officer, RRI
2.	Percentage on cost of materials and labour to cover all overheads and profits	15%
3.	Schedule of Rates (SOR)	As per latest CPWD and DOS.

REF: CLAUSE 1 OF GCC: PERFORMANCE GUARANTEE	
(i) Time allowed for revalidating the earnest money as performance Guarantee, from the date of issue of letter of acceptance.	Not applicable
(ii) Maximum allowable extension beyond the period provided in (i) above	15 days
REF: CLAUSE 2A OF GCC: COMPENSATION OF DELAY	
Authority of fixing compensation under clause 2A	Director, Raman Research Institute
REF: CLAUSE 5 OF GCC: TIME & EXTENSION FOR DELAY	
Number of days from the date of issue of letter of Acceptance for reckoning date of start	As per work order
Time allowed for execution of work	**75 days** from the date of issue of work order.

REF: CLAUSE 6 & 6A OF GCC: MEASUREMENT OF WORK DONE AND COMPUTERIZED MEASUREMENT BOOK

Clause applicable: 6/ 6A (non-applicable clause to be strike off)

REF: CLAUSE 10A OF GCC: MATERIALS TO BE PROVIDED BY THE CONTRACTOR

List of testing equipment to be provided by the contractor at site lab.

1		4	
2		5	
3		6	

REF: CLAUSE 10 B (ii) OF GCC: MOBILIZATION ADVANCE, INTEREST & RECOVERY

Whether Clauses 10 B (ii) shall be applicable No

(This is applicable only for works more than Rs.2.00 crores)

REF: CLAUSE 10A OF GCC: MATERIALS TO BE PROVIDED BY THE CONTRACTOR

List of testing equipment to be provided by the contractor at site lab.

REF: CLAUSE 10 B (ii) OF GCC: MOBILIZATION ADVANCE, INTEREST &RECOVERY

Whether Clauses 10 B (ii) shall be applicable No

(This is applicable only for works more than Rs.2.00 crores)

REF: CLAUSE 12 OF GCC: DEVIATIONS/ VARIATIONS, EXTENT AND PRICING

Deviation limit beyond which clause 12 shall apply

For Superstructure Work	**25%**
For Foundation Work	**50%**

REF: CLAUSE 16 OF GCC: ACTION IN CASE OF WORK NOT DONE AS PERSPECIFICATION

Competent Authority for deciding reduced rates: Director RRI

REF: CLAUSE 25 OF GCC: SETTLEMENT OF DISPUTES AND ARBITRATION

Law court of Jurisdiction : BANGALORE
KARNATAKA

REF: CLAUSE 36 OF GCC: EMPLOYMENT OF GRADUATE/ DIPLOMA ENGINEERS

Sl. No.	Minimum qualification of Technical representative	Discipline	Designation (Principal Technical/ Technical representative)	Minimum experience	Number	Rate at which recovery shall be made from the contractor in the event of not fulfilling provision of clause 36 (i)
1						
2						

REF: CLAUSE 41 OF GCC: RETURN OF MATERIALS AND RECOVERY FOR EXCESS MATERIALISSUED.

(i) Variations permissible on theoretical quantities:

(a)	Cement for works with estimated cost put to Tender not more than Rs. 5 Lakhs	5% plus/minus
	For works with estimated cost put to Tender more than 5 lakhs	2% plus/minus
(b)	Bitumen for all works	2.5% plus only & Nil on minus side
(c)	Steel Reinforcement and structural steel sections for each diameter, section and category	2% plus/minus
(d)	All other materials	Nil

(ii) Recovery rates for quantities beyond permissible variation:

Sl. No.	**Description of Item**	**Rates in figures and words at which recovery shall be made from the Contractor**	
		Excess beyond Permissible variation	**Less use beyond the permissibl evariation**
1.	Cement		
2.	Steel reinforcement a) M.S. Bars b) HYSD bars		
3.	Structural Sections		
4.	Bitumen issued free		

5.	Bitumen issued at stipulated fixed Price		

SCHEDULE 'G' – CO-EFFICIENT FOR CEMENT CONSUMPTION

Refer Separate Booklet

SCHEDULE 'H' – STANDARD SAFETY CODES

Refer Separate Booklet

SCHEDULE 'I' – CPWD/BIS TECHNICAL SPECIFICATION

Refer Separate Booklet

PART- III

FORMATS

(TO BE FILLED IN BY THE TENDERER/ CONTRACTOR)

a. DRAFT BANK GUARANTEE BOND FORPERFORMANCE SECURITY (GUARANTEE)

1. In consideration of the Director, Raman Research Institute (hereinafter called "TheGovernment") having offered to accept the terms and conditions of the proposed agreement between …… …….. and ……
(hereinafter called "the said Contractor(s)") for the work (hereinafter called "the said agreement") having agreed to production of a irrevocable Bank Guarantee for Rs…….. (Rupees …….. only) as a security/guarantee from thecontractor(s) for compliance of his obligations in accordance with the terms andconditions in the said agreement.

2. We, ……(indicate the name of the bank) do hereby undertake to pay the amounts due and payable under this guarantee without any demure, merely on a demand from the Government stating that the amount claimed as required to meet the recoveries due or likely to be due from the said contractor(s). Any such demand made on the bank shall be conclusive as regards the amount due and payable by the bank under this Guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs……
(Rupees …… Only).

3. We, …… (indicate the name of the Bank) the said bank further undertakes to pay the Government any money so demanded notwithstanding any dispute or disputes raised by the contractor(s) in any suit or proceeding pending before any court or Tribunal relating thereto, our liability under this present being absolute and unequivocal.

   The payment so made by us under this bond shall be valid discharge of our liabilityfor payment thereunder and the Contractor(s) shall have no claim against us for making such payment.

4. We, …… (indicate the name of the Bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to be enforceable till all the dues of the Government under or by virtue of the said agreement have been fully paid and its claims satisfied or discharged or till Engineer-in-charge on behalf of the Government certified that the terms and conditions of the said agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this guarantee.

5. We,…… (indicate the name of the Bank) further agree with the Government th-t the Government shall have the fullest liberty without our consent and without affecting in any manner our obligation hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by thesaid Contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Government against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said contractor(s) or for any forbearance, act of omission on the part of the Government or any indulgence by the Government to the said Contractor(s) or by any such matter or thing

whatsoeverwhich under the law relating to sureties would, but for this provision, have effect of so relieving us.

6. This guarantee will not be discharged due to the change in the constitution of the Bank or the contractor(s).

7. We, ... (indicate the name of the Bank) lastly undertake not to revoke this guarantee except with the previous consent of the Government in writing.

8. This guarantee shall be valid up to ..... unless extended on demand by the Government. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs..... (Rupees ..... only) and unless a claim in writing is lodged with us within six months of the date of expiry or the extended date of expiry of this guarantee all our liabilities under this guarantee shall stand discharged.

Dated the ..... day of ..... for..... (indicate the name of the Bank)

b. DRAFT BANK GUARANTEE BOND FOR SECURITY DEPOSIT

1. In consideration of the Director, Raman Research Institute (hereinafter called "The Government") having agreed to exempt …… (hereinafter called "the said Contractor(s)") from the demand, under the terms and conditions of an Agreement No……dated made between …… and …… for the work …… (hereinafter called "the said Agreement") of Security Deposit for the due fulfillment by the said Contractor(s) of the terms and conditions contained in the said Agreement, on production of a Bank Guarantee for Rs…… (RUPEES …… …… ONLY).We…… (indicate the name of the Bank) …… (hereinafter referred to as the Bank") at the request of …… Contractor(s) do hereby undertake to pay to the Government an amount not exceeding Rs (RUPEES …… ONLY) on demand by Government.

2. We, ……
(indicate the name of the Bank) do hereby undertake to pay amounts due and payable under this guarantee without any demure merely on a demand from the Government stating that the amount claimed is required to meet the recoveries dueor likely to be due from the said Contractor(s). Any such demand made on the Bank shall be conclusive as regards to amount due and payable by the Bank underthis Guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs……

3. We undertake to pay to the Government any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) in any suit or proceeding pending before any court or Tribunal relating thereto, our liability under this present being absolute and unequivocal.

   The payment so made by us under this bond shall be valid discharge of our liabilityfor payment thereunder and the Contractor(s) shall have no claim against us for making such payment.

4. We, ……
(indicate the name of the Bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to be enforceable till all the dues of the Government under or by virtue of the said Agreement have beenfully paid and its claims satisfied or discharges or till Engineer-in-charge on behalf of the Government certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this guarantee.

5. We, ……
(indicate the name of the Bank) further agree with the Government that the Government shall have the fullest liberty without our consent and without

affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Agreement or to extend time of performance by the said Contractor (s) from time to time or to postpone for any time or from time to time any of the powersexercise ably by the Government against the said Contractor(s) and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor(s) or for any forbearance, act or omission on the part of the Government or any indulgence by the Government to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision, have effect of so relieving us.

6. This guarantee will not be discharged due to the change in the constitution of theBank or the Contractor (s).

7. We, ……
(Indicate the name of the Bank) lastly undertake not to revoke this guarantee exceptwith the previous consent of the Government in writing.

8. This Guarantee shall be valid up to ..... Unless extended on demand by Government. Notwithstanding anything mentioned above,our liability against this Guarantee is restricted to
Rs..... .....(R
UPEES ONLY) and unless a claim in writing is lodged with us within six months of the date of expiry or the extended date of expiry of this Guarantee, all our liabilities under this Guarantee shall stand discharged.

Dated the .....day of ..... 20..... for
.....
(indicate the name of the Bank)

Note: -

Before a Bank Guarantee is accepted, an affidavit duly sworn in before a first classmagistrate, may also be taken from the Contractor that he would keep the validity of the Bank guarantee intact by getting it suitably extended from time to time, at hisown initiative, up to a period of twelve months for any other maintenance period prescribed in the agreement after the recorded date of completion of the work as directed by the Engineer-in-charge and indemnifies the Government against any losses arising out of non-encashment of Bank guarantee. Such an undertaking maybe taken on a non-judicial stamp paper, as required, in the enclosed proforma.

SPECIMEN

c. BANK GUARANTEE TO SECURE A MOBILISATION ADVANCE

TO

The Director, Raman Research Institute, Bangalore

1. In consideration of the Director, Raman Research Institute (hereinafter called "the Government" which expression shall unless repugnant to the subject or context include his successor and assigns) having agreed under the terms and conditions of Contract No..... Dated..... made between * ..... and the Government in connection with.....[hereinafter called "the said Contract"] to make at the request of the Contractor a lumpsum advance of Rs..... (Rupees .....) for utilizing it for the purpose of the Contract on his furnishing a guarantee acceptable to the Government, we the **..... Bank Ltd. (hereinafter referred to as "the said Bank") a company under the Companies Act, 1956 and having our registered office at ..... Do hereby guarantee the due recovery by the Government of the said advance with interest thereon as provided according to the terms and conditions of the Contract. We **..... do hereby undertake to pay the amount due and payable under this Guarantee without any demur, merely on a demand from the Government stating that the amount claimed is due to the Government under the said Agreement. Any such demand made on the .....Shall be conclusive as regards the amount due and payable by the ..... under this guarantee and the ..... agree that the liability of the..... to pay the Government the amount so demanded shall be absolute and unconditional notwithstanding any dispute or disputes raised by the Contractor and not withstanding any legal proceeding pending in any Court or Tribunal relating thereto. However, our liability under this Guarantee shall be restricted to an amount not exceeding Rs..... (Rupees .....).

2. We **..... Bank Ltd. further agree that the Government shall be the sole judge and as to whether the said Contractor has not utilized the said advance or any part thereof for the purpose of the contract and the extent of loss or damage caused to or suffered by the Government on account of the said advance together with interest nowbeing recovered in full and the decision of the Government that the said Contractor has not utilized the said advance or any part thereof for the purpose of the Contract and as to the amount or amounts of loss or damage caused to or suffered by the Government shall be final and binding on us.

3. We, the said Bank further agree that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract and till the said advance with interest has been fully recovered and its claims satisfied or discharged and till certify that the said advance with interest has been fully recovered from the said Contractor, and accordingly discharges this Guarantee subject, however, that the Government shall have no claims under this Guarantee after six months from date of completion of the said Contract, as the case may be, unless a notice ofthe claim under this Guarantee has been served on the Bank before the expiry if the said period of six months in which case the same shall be enforceable against the Bank notwithstanding the fact that the same is enforced

after the expiry of the said period of six months.

4. The Government shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee or indemnity, from time to time to vary any of the terms and conditions of the said contract or the advance or to extend time of performance by the said Contractor or to postpone for any time and from time totime any of the powers exercisable by it against the said contractor and either to enforce or forbear from enforcing any of the terms and conditions governing the said Contract or the advance or securities available to the Government and the said Bank shall not be released from its liability under these presents by any exercise by the Government of the liberty with reference to the matters aforesaid or by reasons of time being given to the said Contractoror any other forbearance, act or omission on the part of the Government or any indulgence by the Government to the said Contractor or of any other matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect of so releasing the Bank from its such liability.

5. It shall not be necessary for the Government to proceed against the contractor before proceeding against the Bank and the Guarantee herein contained shall be enforceable against the Bank notwithstanding any security which the Government may have obtained or obtain from the Contractor shall at time when proceedings are taken against the Bank hereunder be outstanding or unrealized.

6. We, the said Bank lastly undertake not to revoke this Guarantee during its currency except with the previous consent of the Government in writing and agree that any change in the constitution of the said Contractor or the said Bank shall not discharge our liability hereunder.

7. This guarantee shall be valid up to ..... unless extended on demand by
8. Government. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs..... [Rupees .....] and unless a claim in writing is lodged with us within six months of the date of expiry or the extended date ofexpiry of this guarantee all our liabilities under this guarantee shall stand discharged.

Dated this ..... day of 2026
For and on behalf of the Bank .....[Name and Designation]
The above Guarantee is accepted by the Director, Raman Research Institute .....
Or:

For and on behalf of the Director, Raman Research Institute

..... [Name and Designation]

SPECIMEN

FORMAT 3

AFFIDAVIT

I/ We, have submitted a Bank guarantee for the work ……
(Name of work) Agreement No. …… dated…… from …… (Name of Bank with full address) to the Administrative Officer, RRI/Engineer-in-charge with a view to seek exemption from payment of Security Depositing cash. The Bank guarantee expires on I/ We undertake to keep the
validity of the Bank guarantee intact by getting it extended from time to time at my/our own initiative up to a period of ……months
after the recorded date of completion of the work as directed by the Engineer-in-charge.

I/We also indemnify the Government against any losses arising out of non-encashment ofthe Bank guarantee, if any.

Note: This affidavit is to be given by the executant before a first-class Magistrate.

Signature with legal address

Witnesses:

1)……

2)……

SPECIMEN

FORMAT 4

INDEMNITY BOND

Note:

The contractor shall furnish an indemnity bond in non-judicial stamp paper worth Rs.500/- within ten days of the acceptance of the tender as per the format given below:

In consideration of the Director, Raman Research Institute, this bond of indemnity is hereby mad- on this day the ..... of ....e.....20.... between M/s./Shri..... (Hereinafter called the first party) in favor of the Director, Raman Research Institute represented by Engineer in chargeof the work of ..... (Hereinafter called second party)

Whereas the first party is the contractor for the said work and whereas the first party hasagreed to comply with the clause 19 of the General Conditions of Contract (GCC) for the said work.

Now this deed witnesses that the first party agrees to be liable to indemnify the Government/ second party in accordance with clause 19 in General Conditions of Contract (GCC) for the said work and shall at all times keep the Government/ second party indemnified against all future claims in respect of the said clause and first party also agrees to indemnify the Government/ second party against or in respect of all charges, costs and damages which the Government/ second party may incur on account of default made by the first party in respect of the said clauses.

In witness whereof the first party has signed this bond on the date first above written in the presence of following witnesses.

Signature of First party

Witnesses:

1).....

2).....

SPECIMEN

TECHNICAL SPECIFICATIONS

❖ **HVAC WORKS**

The HVAC Tender document explains about design criteria envisaged for the proposed project.

The HVAC Concept Brief includes the following:

- ♣ HVAC Design Brief - Scope of Work
- ♣ Design Criteria envisaged.
- ♣ Information regarding ambient conditions envisaged for design.
- ♣ Details about desired indoor conditions (Temperature & RH).
- ♣ HVAC AHU zonings Layout.
- ♣ Main Features of Proposed Design.

♣ **Scope of Work**

The scope of HVAC works includes the following:

- Design of Air Conditioning System for Proposed Lab.
- Preparation of Area Classification Zoning Layout.
- Preparation of AHU wise Zoning Layout.
- Pressure Gradient Layout.
- Preparation of Design Brief.
- Recirculation type ISO 8 @ Rest Air Conditioning system with DX VRF cooling coil is envisaged for Proposed

Outside Design Conditions

Location: Bangalore, Karnataka.

- **OUTSIDE CONDITIONS:**
- **SUMMER (April)**

DRY BULB TEMPERATURE	:	96° F
WET BULB TEMPERATURE	:	78° F
RELATIVE HUMIDITY	:	47.2 %

- **WINTER (January)**

DRY BULB TEMPERATURE	:	58° F
WET BULB TEMPERATURE	:	54° F
RELATIVE HUMIDITY	:	79.1 %

- **MONSOON (September)**

DRY BULB TEMPERATURE	:	82° F
WET BULB TEMPERATURE	:	78° F
RELATIVE HUMIDITY	:	84.5 %

♣ **Indoor Design Conditions**

CLASSIFICATION	DRY BULB TEMPERATURE ° C	RELATIVE HUMIDITY %
ISO 8 @ REST	NMT 21+/-1° C	NMT 55+/5 %

MAIN FEATURES :

- 2.4 & 2.9 Mtrs Height False ceiling is considered for Heat Load calculations.
- 60 Kw X 0.5 = 30 Kw Equipment load considered for heat load calculation.
- 6 nos people load considered for heat load calculation.
- No Exhaust considered for heat load calculation in Lab area.
- Plant Operation shall be considered for 24 hours per day, for 7 days a Week.
- For continuous 24/7 operation, 2 Nos. of AHUs with 1 working + 1 standby arrangement. The AHUs will operate alternately, with each unit running for 12 hours while the other remains on standby, ensuring uninterrupted operation and equal equipment utilization.
- All Entry / Exit Doors for men & material shall be of Clean room type, The doors shall be with self-closing arrangement & doors openings shall be with respect to the Pressure gradients layout. Door shall be part of clean room panel tender.
- All areas of the proposed plant shall run simultaneously. There shall not be any heat gain from interconnecting / adjacent areas.
- All rooms shall be designed to attain the desired pressure levels within the range & relative to adjacent areas. The room pressure shall be maintained by fixed airflow differentials achieved by the air balance of the supply & return air quantities. Space pressure differentials will be designed to cascade from the cleanest classified areas to the non – critical space.
- All Classified room differential pressure will be monitored using localized Analog type Magnahelic Gauge.
- The pressure differential considered shall be sufficient enough to prevent any reversal of airflow direction. The pressure differential concept considered is as under.
- Same Class & Same AHU – 10 Pascal Difference.
- Unclassified to Classified – 15 Pascal Difference.
- For validation purpose the variation in room differential pressure shall be ± 2 Pascal from designed value.
- All Pressure values mentioned are with respect to Ambient.
- Room air flow rate is calculated based on the quantity of dehumidified air required to remove thermal loads or the minimum air changes, whichever is greater.
- Inside room conditions (Temp/RH) shall be maintained before start of process.

- Clean Room shall be of Recirculation type Air conditioning system. Air Handling Unit comprising of Mixing section with Return Air Damper, Fresh Air Damper, G4 +F7 Combined Type Filter-Section, DX VRF Cooling coil Section, Supply air Blower section comprising of Plug Fan with IE 3 Drive Motor, Bleed Air Damper with H13 HEPA Filter Section & Supply Air Plenum with Volume Control Damper.

- Filtered, cooled and dehumidified air from the AHU's shall be feed into the Clean Room shall be Supplied through an Insulated GI Duct with Terminal HEPA Filter with module & Return is taken through return air raisers with Pre filter (G4 grade), collar damper, module & SS perforated grille.

- It is proposed to have direct driven Plug Fans in all AHU.

- It is proposed to have IE 3 Drive Motors for All Air Handling Units (compatible for operation with Variable frequency drive).

- The AHU sizing / orientation shall be designed to suite to site condition / requirement.

- DX VRF type cooling coil provided to take care the Temperature requirement.

- Electrical Duct Heater is considered to take care the RH requirement.

- In the classified Areas low level Return is taken through return air raisers with Pre filter (G4 grade), collar damper, module & SS perforated grille. Return air raiser is shall be an integral part of clean room panel tender.

- The ducting shall be designed as per SMACNA standards & the specifications mentioned in the tender.

- The dust particles are arrested at the source of generation (by filters in return air raiser) & the ambient dust is filtered at AHU level & hence the filter maintenance will be reduced & the life of the filters shall increase.

- Terminal (H14) HEPA Filter where the velocities should not exceed more than 0.8 to 1.0 m/sec.

- Washable & reusable filters are proposed in primary section of AHU & in return air raiser. Whereas disposable type filters are proposed in the secondary filter section & fine filter section of the AHU.

- G4, F7 Filters are placed in AHU plenum to reduce load on Terminal HEPA Filters.

- Classified areas ducting shall be with G clamps & pressure testing shall be done for 750 Pascal.

- Thermal insulation for ducting using non-fibrous, CFC free, closed cell, elastomeric Nitrile Rubber foamed insulation in pre-formed sheets with thermal conductivity of not more than 0.036 W/(m.k) at 10°C

Technical Spécification For Air Handling Unit

SCOPE: The scope of this section comprises the Design, supply, erection, testing and commissioning of double skin construction air handling units, conforming of these specifications and in accordance with requirements as mentioned in BOQ, HVAC Room data sheet, Air flow diagram and Bill of Quantity.

TYPE: The air handling units shall be double skin construction, draw - thru type comprising of various sections such as mixing box, filter section, DXVRF Cooling coil, Fan section, Fine filter section along with fresh air, return air, supply and bleed off dampers as per details given in Air flow diagram and Bill of Quantity.

CAPACITY: The air handling capacities and static pressure indicated ın the BOQ are for guidance only. Please refer Air flow diagram and Bill of Quantity.

On finalization of the HVAC contractor the final Air flow diagr.m / Static pressure and the coil capacity has to be reconfirmed by vendor (the variation will be in the range of +/-10%).

HOUSING/CASING: The housing/c.sing of the air handling unit shall be of double skin construction. The Frame work shall be of Extruded Aluminum hollow sections. The entire frame shall be assembled using pressure die cast aluminium joints to make a sturdy, strong & self-supporting frame work for various sections. Units shall be complete with Thermal Break Profile as well as Double Skin Panels in Thermal Break Construction.

45 mm thick Double Skin Panels shall be m.de of 0.8 mm Pre-painted GSS / Pre-plasticized on outside and 0.8 mm Pre-painted GSS / Pre-plasticized sheet in the inside with PUF insulation injected in between.
The GSS sheet used for the Panel Manufacturing should have a minimum zinc coating of 120 gms/sqmts on both sides. These panels sh.ll be screwed on to the frame work with soft rubber gasket fixed in built-in groove of aluminum frame in between to make the joints air tight to create a smooth surface inside and outside. All panels shall be sealed (anti fungicide sealant material) against the frame work.

Frame work for each section shall be joined together with soft rubber gasket (EDPM) in between to make the joints air tight. Suitable air tight access doors/panels with Nylon hinges with the door hinge pin fabricated of stainless steel. Locks shall be provided for access to various sections for

maintenance. Inspection Doors shall be provided with special Gasket (Food Grade Neoprene Rubber gasket-D type) for complete air tightness. The entire housing shall be mounted on Rolled Formed GSS channel frame work of 100mm height, having pressure die cast aluminium jointers.

AHUs (1.8Mts high and above) shall be provided with 3mm thick aluminium anti slip plate on fan section and the filter section with inspection door.

Dampers shall be of opposed blade louver type. Blades shall be made of extruded aluminium construction and shall be rattle-free. For ventilation & exhaust units fresh air /exhaust louvers of extruded aluminium construction shall be provided along with bird screen & dampers. Low leakage type aluminium volume control damper with extended stem for mounting damper actuator.

Each Section has to have a Tag on the casing, mentioning the component (Mixing Box, Filter Section etc.). Also the Airflow direction has to be marked on the casing.

All the AHU after assembly at site has to be cleaned and mopped with disinfectant before fixing the filter, Pressure tested for leakage and leakage rate to be in compliance with Mechanical Performance as per EN 1886:1998.

FILTERS: Each unit shall be provided with a factory assembled filter section. GSS Holding frames shall be provided for installing a number of filter cells in banks. These cells shall be held within the frames by sliding the cells between guiding channels Filters are to be inserted in frames and fastened by means of retaining springs which press the filter frame against tightening strip. Filter with different frame thickness can be mounted in the filter frame as the retaining springs can be fastened at varying distance from the edge of impact. Filter shall fit so as to prevent bypass.

Filter media and frame shall be rust proof and corrosion resistant. Filters face velocity shall not exceed 135 meters per minute / 450 FPM. The filters are to be of reputed make and shall be of standard sizes (like 610X610 mm, 610X305mm, 305x305mm) for easy replacement during maintenance.

DX VRF COOLING COIL: Coils shall be of the fin and tube type having aluminium fins mechanically bonded to copper tubes. All tubes shall be in staggered pattern. The fins shall be minimum 0.14 mm thick aluminium at a pitch of 5 fins/cm, all the tube connections to headers and return bends shall be brazed with silver brazing alloy. Drain pan made out of 20swg SS 304 shall be provided. The drain Pan should be designed with dual slope to facilitate fast removal of condensate and avoid microbial growth. The Drain Pan shall be duly extended beyond cooling coil depth by 500mm. Drain Pan

shall be externally insulated with closed cell elastomeric insulation. Any Stacked or double height coils shall have a separate drain pan to reduce carry over.

Cooling coils should have the capacities as indicated in the Bill of quantities. The cooling coils should have Refrigerant as the cooling medium. The heat exchanger should be removable from the side and the frame material should be stainless steel SS304. The air velocity across the coil face shall be around 400 to 450 FPM.

The cooling coil section shall be suitable for DX system with R410A / R32 refrigerant.

Cooling coil should be easily slide able type from sides without disturbing other sections for maintenance. Cooling Coil supports should be in complete stainless steel material. No MS supports are acceptable.

Necessary clamping points for Eva IN & Eva OUT shall be provided on the coil header.

18 gauge SS-304 insulated minimum 13 mm insulation (MOC of insulation shall be as per AHU manufacturer standard) condensate tray with drain pipe & U trap shall be provided

INSPECTION SECTION: The Inspection section shall be for inspection of other functional sections.
AHU GA drawing to be submitted as a part of technical offer.

AHU Vendor to take approval of technical submittals and GA drawing.

TESTING: The air handling unit shall be tested to measure air quantity and coil performance by measuring Enthalpy difference, Air flow rate and Temperature drop across the coil and then calculating the capacity by using the above measurements.

LIMITATION: The air velocity across the filter media shall not exceed 2.25 m/s (450 FPM). The air velocity across the coil shall not exceed 2.25 m/s (450 FPM).

The air velocity at the fan outlet shall not exceed 10.5 m/s (2100 FPM).

FAN:

Backward curved plug fan.

The fan shall be backward curved direct driven plug type. The impeller shall be fabricated from heavy gauge steel or corrosion resistant steel with powder coating. The Impeller shall be statically & dynamically balanced at factory.

Powder coated steel impeller shall be placed directly on the motor shaft with taper lock clamping bush thus producing a loss free and maintenance free drive. The fan shall be selected for highest efficiencies and a noise level less than 85 db (A) at 1m distance from equipment.

The fan Impeller with motor shall be mounted on a common epoxy painted steel base mounted inside the AHU housing. The complete drive assembly should be on spring-loaded anti-vibration type mounts. The fan inlet shall be connected to the casing with the help of fire-retardant gasket acting as a flexible connection for anti-vibration.

The fan unit can be removed sideways. The fan door should be equipped with protection grille with Limit Switch and can be opened only with a tool. The fan should have inspection glass and a limit switch in the maintenance door.

Marine type Light fixture shall be provided in the chamber.
Safety main control for limit switch and chamber lighting by manufacturer and only power termination to the outside switch on the AHU wall is by Client.

The fan should be provided with ring tube for easy balancing and commissioning. The fan shall be operated through a variable frequency drive. While selecting fan frequency shall be kept close to 50Hz and RPM shall be preferably within +/-10% of designated RPM of Motor.

The design pressure @ rated Airflow should be achieved at not more than 75% of the fan first critical speed.

The fan power data are documented by TÜV- approved unit characteristic curves or equivalent. The fan curves should be submitted during finalization of the order.

Fan should have a ring for measuring capacity at site. Fan capacity should be demonstrated during the commissioning stage at Site. Fan should be selected for minimum static efficiency of 70%

Motor will have 20% additional rating over the shaft power.
Pressure transducer to be considered for online measurement of static pressure across blower.

MOTOR AND DRIVE: Fan motors shall be 415 for 10% volts, 50 cycles, 3 phase, squirrel-cage totally enclosed fan cooled with IP - 55 protections with mounting method B3 and Class F insulation.
Motor shall be especially designed for quiet operation and as far as possible motor speed shall not exce-d 1440 RPM. Fan section in AHU shall be provided with cable inlet set fitted at factory. Drilling AHU wall panels at site is not allowed (AHU vendor shall replace the panel with a new one if it is found that the drilling or cutting is done at site).

SAFETY FEATURES AS UNDER:

1. The Fan Access Door shall be equipped with micro-switch inter locked with fan motor to enable switching of the fan motor automatically in the event of door opening.
2. The Access Door shall further have wire mesh screen as an added safety feature bolted on to the unit frame.
3. Leak Proof Hinged service door/Removable Panel with handles.
4. Fan and motor base shall be properly earthed from the factory.
5. All screws used for panel fixing and projecting inside the unit shall be covered with PVC caps.
6. All internal wiring for the light fixtures, micro switch inter locking with fan motors to be carried out in the factory and terminated on the AHU casing in junction box.
7. Double Glazed inspection window made from polycarbonate material. Each glazing to be of minimum 6 mm thickness.
8. Low Leakage extruded aluminum aerofoil opposed blade type (0 to100 %) damper (Manual Operation).

ACCESSORIES

In addition, the following accessories may be required at air handling units, their detailed specifications are given in individual sections and quantities separately identified in Bill of Quantities.

- MS Powder coated Box with Magnahelic gauges in AHU to be provided for all type of filters.
- Marine light and view glass for fan and filter sections has to be provided wherever required /specified.
- Pressure measuring ports (6mm SS) with dead nut shall be provided across each section to monitor the pressure drops.
- Temperature measuring ports (3/4" / 19mm SS) at the inlet and

outlet of cooling/heating batteries shall be provided to monitor the temperature.

- Each AHU shall be provided with laminated colored AHU GA drawings showing all the Components / Air flow Drawings duly pasted on AHU.
- Each air handling unit shall be provided with manual air vent at high point in the cooling coil and drain plug in the bottom of the coil.

PERFORMANCE DATA: Air handling units shall be selected for the lowest operating noise level of the equipment. Fan performance rating and power consumption data, with operating points clearly indicating shall be submitted and verified at the time of testing commissioning of the installation.

TESTING: Cooling capacity of various air handling unit models shall be computed from the measurements of air flow, dry and wet bulb temperatures of air entering and leaving the coil. Flow measurements shall be by an anemometer / Capture Hood and temperature measurements by accurately calibrated mercury in glass thermometers. Computed results shall conform to the specified capacities and quoted ratings. Power consumption shall be computed from measurements of incoming voltage and input current.

DRAIN PIPING

All condensate drains should be routed with proper slope to nearest drain point through PVC pipes of minimum thickness 3 mm. Pipes above false ceiling must be insulated with 9 mm thick cross-linked expanded Poly Ethylene Tubular insulation. Pipes buried inside walls or below flooring must be insulated as above and further wrapped with 3 mm thick tar felt / bituminous cloth.

Pipes above false ceiling must be supported at every 1 m distance using circular PVC / metal clamps and full-threaded GI rods 6 mm dia. and must not be allowed to have sags. PVC pipe sleeves must be provided at each support in order to distribute the clamping pressure on a larger area of insulation. In the event of more than one drains being connected to same pipe, “U” traps should be used between indoor machine and common drain header.

Drain piping must be hydro - tested with the help of colored water held in pipes for 24 hours at a pressure of 1 Kg / sq cm. After testing, the open ends should be properly plugged with removable plugs and a certificate of drainpipe testing and plugging should be submitted prior to closing false ceiling / closing shaft / making up w.ll or partition chasing.

TECHNICAL SPECIFICATION FOR DUCTING & INSULATION

SCOPE: The scope of this section comprises supply, fabrication, installation and testing of all sheet metal ducts, balancing of all perforated sheets, grilles and diffusers, nuts, bolts, supports, gaskets etc. complete and duly installed conforming to relevant specified standards/codes. For this purpose, it is contractors responsibility to arrange at site all necessary equipment and necessary workforce.

FABRICATION STANDARDS: All ductwork including straight sections, tapers, elbows, branches, show pieces, collars and other transformation pieces shall be factory fabricated. In addition ducts shall be factory fabricated utilizing the following machines to provide the requisite quality of ducts. All the duct fabrication shall be as per SMACNA (Sheet Metal and Air Conditioning Contractors National Association) standards.

Coil (Sheet metal in Roll Form) lines to facilitate location of longitudinal seams at corners/folded edges only, to obtain the required duct rigidity and leakage free characteristics. No longitudinal seams permitted along any face side of the duct.

All ducts, transformation pieces and fittings to be made on CNC profile cutter for requisite accuracy of dimensions, location and dimensions of notches at the folding lines.

All edges to be machine treated using lock formers, flanges and rollers for turning up edges.

Sealant dispensing equipment for applying built-in sealant in Pittsburgh lock where sealing of longitudinal joints are specified.

DUCT MATERIAL: All Ducting shall be fabricated of LFQ (Lock Forming Quality) grade prime GI raw material furnished with accompanying Mill Test Certificates.
Galvanizing shall be Class VIII – light coating of zinc, nominal 120 gm/Sq.m surface area coating on both sides. In addition, if necessary, samples of raw material, selected at random by engineer-in-charge shall be subject to approval and tested for thickness and zinc coating at contractor's expense. GI raw material shall be used in coil form (instead of sheets) so as to limit the longitudinal joints irrespective of cross-section dimensions.

All Duct work (thickness below 16 Gauges) including straight sections, tapers, elbows, branches, shoe pieces, collars, terminal boxes and other transformation pieces must be factory fabricated.

All transverse connectors/flanges shall be made of MS angle minimum 3 mm thick, duly red oxide painted and finished with a coat of black paint.

Mill Test Certificates for the G.I raw material shall be provided.

DUCT CONSTRUCTION:

A. Duct construction shall be in compliance with relevant static pressure norms as per SMACNA.

B. The fabricated duct dimensions should be as per approved drawings; all connecting sections shall be dimensionally matched to avoid any gaps.

C. All fabricated dimensions shall be within +/- 1.0 mm of specified dimensions. To obtain required perpendicularity, permissible diagonal tolerances shall be +/- 1.0 mm per meter.

D. Each and every duct pieces should be identified by color coded sticker which shows specific part numbers, job name, drawing number, duct sizes and gauge.

E. Ducts shall be straight and smooth on the inside. Longitudinal seams shall be airtight and at corners only, which shall be either Pittsburgh or Snap Button Punch as per SMACNA practice, to ensure air tightness.

F. Changes in dimensions transformation of ducts shall be achieved gradually (between 1:4 and 1:7). Turning vanes or air splitters shall be installed in all bends and duct collars designed to permit the air to turn without appreciable turbulence.

G. Plenums shall be shop/factory fabricated - panel type and assembled at site.

H. The deflection of transverse joints should be within specified limit for rectangular duct deflection as given in SMACNA. Page No. 7.6

I. Reinforcement of ducts shall be achieved by either cross breaking or straight beading depending on length of ducts. As per SMACNA page no.1.74 .fig 1-8 Duct Sizes 19”(483mm) wide and larger which have more than 10Sqft of Unbarred panel shall be beaded or cross broken unless ducts have insulation covering or acoustical liner. The requirement is applicable to 20gauge (1.00mm) or less and 3”W.G (750 Pa) pressure or less. Ducts for 4”W.G (1000Pa) or more do not require beads or Cross breaks.

J. Elbows, bends, offsets, etc., should be fabricated with a width to radius ratio of not less than 1.0 to 1.5. Alternately, turning vanes should be provided at intervals so chosen that the aspect ratio of the various sections so formed by the vanes will be at least five.

K. Turning vanes shall be provided at branch take-offs and collars. Similarly, straightening vanes shall be provided in all the collars unless and except in cases where conditions at site do not permit their installation.

L. G Clamp is a universal flange clamp, formed out of zinc coated solid metal.

M. The G Clamp shall be designed to cope with high loads. The G Clamp bolt shall always be the same size as the corresponding flange bolt.

N. The installation shall be carried out by using electric torque wrench machine for uniform tightening of flanges.

O. Installation of G Clamp shall start by fitting the G Clamps from the corner bolt and towards the center of the duct. The gap between the G clamp shall be approximately 150 to 200.

P. For Duct routing erection please refer AHU Schematic Drawing.

Q. For clean room false ceiling height maintain, Supply air duct run outside of the building and Return air Ducts erected inside of the clean room

SUPPORT SYSTEM:

A complete system consisting of fully threaded galvanized rods, galvanized angles or double-L bottom brackets (made out of 3.0 mm MS sheets with red oxide and black paint) nuts, washers and anchor bolts (Hilti Make) generally conforming to SMACNA standards should be used.

Table Support for Horizontal duct - Rectangular

Sr. No.	Maximum Duct Size(mm)	Hanger Rod Diameter	Support Interval (mm)	Flange /Bracing at every 1200 mm distance.
1	Upto - 700	6 mm	2400	32x32x3
2	701 - 1200	8 mm	2400	40x40x3
3	1201 - 2000	10 mm	2100	50x50x3
4	Above 2000	12 mm	1800	50x50x3

To provide the required thermal break effect, Neoprene or equivalent material of suitable thickness shall be used between duct supports and duct profiles in all supply air ducts and return air ducts.

All support members and any kind of structure required to install duct shall be included in the offer.

INSTALLATION:

Tools and tackles for site work

The duct installation shall conform to SMACNA norms. For duct assembly and installation the suitable tools and tackles shall be used to give the required duct quality and speed of such tools shall include (but not restricted to the following)

a) Electric Pittsburgh Seamer – used for closing Pittsburgh joints

b) Electric Slitting shear – to make cut-outs

c) Drilling machine with drill bits – for drilling holes in sheet metal work

d) Hammer drill machine with drill bits – for drilling holes in building structures for anchors

e) Hoisting system – for lifting the duct assembly up to mounting heights (Duct Lifters to be used for safety).

Installation Practice

All ducts shall be installed in strict accordance with approved shop drawings to be prepared by the Contractor.

Following tools and tackles shall be used to give the required duct quality and speed of installation including:

- Electric Pittsburg Seamer – used for closing Pittsburg joints.
- Electric Slitting Shear – to make cut-outs.
- Drilling machine with drill bits – for drilling holes in the sheet metal work.
- Hammer drill machine with drill bits – for drilling holes in the building structure for anchors.
- Hoisting system – for lifting the duct assembly upto mounting heights.

- All ducts shall be installed generally as per tender drawings, and in strict accordance with approved shop drawings to be prepared by the Contractor.

- The Contractor shall provide and neatly erect all sheet metal work as may be required to carry out the intent of these Specifications and Drawings. The work shall meet with the approval of Owner's site representative in all its parts and details.

- All necessary allowances and provisions shall be made by the Contractor for beams, pipes, or other obstructions in the building, whether or not the same are shown on the drawings. Where there is interference / fouling with structural work, plumbing or other pipes, and conduits, the ducts shall be transformed or modified as per actual site conditions.

- After the end of the day working, the contractor shall temporarily close all duct openings with PVC foil / polyethylene sheets with tapes to prevent debris / dust entering into ducts and maintain them clean. Opening for grilles shall also be closed in the same manner. Ducting over false ceilings shall be supported from the slab above, or from beams. In no case shall any duct be supported from false ceiling hangers or b· permitted to rest on false ceiling. All metal work in dead or furred down spaces shall be erected in time to occasion no delay to other contractor's work in the building. Where ducts pass through masonry openings, it shall be provided with thick TF quality expanded polystyrene around the duct. An MS angle of ISA 50 x 50 x 6 shall be riveted to the duct portion passing through wall / opening. The corners of MS frame shall be extended on both sides to serve as fasteners, which shall be grouted in the wall to prevent any leakage between rooms / infiltration of air. The gap between duct surface and MS surface shall be thoroughly sealed with fire barrier mortar for complete sealing. All ducts shall be totally free from vibration under all conditions of operation. Whenever ductwork is connected to fans, air handling units or blower coil units that may cause vibration in the ducts, ducts shall be •rovided with a flexible connection, located at the unit discharge.

- Duct shall not rest on false ceiling and shall be in level from bottom. Taper piec·s shall taper from top.

- The Contractor shall provide and neatly erect all sheet metal work as may be required to carry out the intent of these specifications and drawings. The work shall meet with the approval of Owner's site representative in all its parts and details.

- All necessary allowances and provisions shall be made by the Contractor for beams, pipes, or other obstructions in the building whether or not the same are shown on the drawings. Where there is interference/fouling with other beams, structural work, plumbing and conduits, the ducts shall be suitably modified as per actual site conditions.

- Ducting over false ceilings shall be supported from the slab above, or from beams. In no case shall any duct be supported from false ceilings hangers or be permitted to rest on false ceiling. All metal work in dead or furred down spaces shall be erected in time to occasion no delay to other contractor's work in the building.

- Where ducts pass through brick or masonry openings, it shall be provided with 25mm thick appropriate insulation around the duct and totally covered with fire barrier mortar for complete sealing and supported with the help of angle frame.

- All ducts shall be totally free from vibration under all conditions of operation. Whenever ductwork is connected to fans, air handling units or blower coil units that may cause vibration in the ducts, ducts shall be provided with a flexible connection, located at the unit discharge.

- Duct Sheets or duct shall be stored on wooden ply, not on floor or land.

- Before Installation of duct, it should be thoroughly cleaned.

- All Duct pieces to be covered with Polythene sheeting at both ends and securely taped to prevent ingress of debris/dust/moisture during installation/commissioning.

- For all supply and return air ducts, food grade silicone sealant (approved by USFDA) must be applied on all duct joints including flanges to render the joints air tight.

- Non Toxic, food grade neoprene, P.E or PVC minimum 3 mm thick gasketing with adhesive is required between all mating flanged Joints. Gasket sizes should confirm to flange manufacturers specification.

- Factory fabricated insulated access doors to be provided in ducts for cleaning/maintenance/access of dampers at suitable locations. Leak Tightness of access doors shall be ensured.

- Radium arrow stickers indicating direction of air flow in duct shall be provided.

Leak - Tightness of Ducting for Clean Rooms:

- Securing a leak tight air distribution system for the Clean Rooms is of the utmost importance in this project.
- Ensure that all duct joint flanges are provided with proper gasket joint at corner with dove tail joint and galvanized nut –bolts. Visually inspect the ducts externally and internally. No Damage of the ducts or dents should be visible. If any duct is found damaged, the same shall be replaced with a new duct before carrying out the test.
- Leak testing shall be carried out to comply with the requirements & provisions of SMACNA's "HVAC Air Duct Leakage Test Manual", First Edition – 1985 or current edition thereof.
- Ducting Construction for various operating pressures involved in the ductwork shall conform to the relevant class-wise construction standards specified in SMACNA's HVAC Duct Construction Standards. Such requirements are shown in the Table 1 of Clause 5 & reproduced below for ready reference.

TABLE- 1

STANDARD DUCT PRESSURE CLASSES AND CORRESPONDING SEAL CLASSES & LEAKAGE CLASSES

Duct Pressure Class		Operating Pressure	Seal Class	Sealing Requirements	Leakage Class
(in)	**(Pa)**				
½" w.g	125	Upto ½" w.g	C	Class C : Transverse joints only	CL 24
1" w.g	250	Over ½" up to 1"w.g			
2" w.g	500	Over 1" up to 2"w.g			
3" w.g	750	Over 2" up to 3"w.g	B	Class B : All Transverse Joints and longitudinal seams only	CL 12
4" w.g	1000	Over 3" up to 4"w.g	A	Class A : All Transverse joints, longitudinal seams, and duct wall penetrations	CL 6
6" w.g	1500	Over 4" up to 6"w.g			

- Contractor shall indicate the duct pressure class being adopted for various sections of ducting and obtain Consultants / Owners approval before taking up the work. The selection of the duct pressure class for the various sections shall be made keeping in view that the total leakage in the duct work does not exceed 1.5% of the total flow rate of the system.

- The duct leakage-testing rig **shall** consist of a fan with damper **/ valve** (for varying **the** flow rate), a flow measuring device like Orifice Plate Assembly with manometer and another manometer / magnahelic gauge (for measurement of static pressure) together with necessary ducting. The orifice plate shall be duly calibrated (for pressure drop >< flow) with instruments whose calibration itself can be traced to accredited laboratories. The details of methodology adopted for calibration and a certificate (for calibration) shall be furnished by the contractor before taking up the work.

Documentation & Measurement of Ducting:

All ducts fabricated and installed should be accompanied and supported by following documentation.

For each drawing all supply of duct works must be accompanied by computer – generated detailed bill of material indicating all relevant duct sizes, dimensions and quantities. In addition, summary sheets are also to be provided showing duct area by gauge and duct size range applıcable.

- All ɖuct pieces to have a part number, which should correspond to the serial number assigned to it in the measurement sheet.
- Measurement sheet covering each fabricated duct piece showing dimensions and external surface area along with summary of external surface area of duct gauge-wise.
- All duct pieces to have a part number, which should correspond to the serial number, assigned to it in the measurement sheet. The above system will ensure speedy and proper site measurement, verification and approvals.
- The same duct piece part number should appear ın all construction as well as in As-built drawings.
- Duct measurements shall be taken after commissioning of the system.
- Grilles and diffusers shall be measured by the cross sectional areas, perpendicular to the air flow, and excluding the flanges.
- Volume control damper and fire damper shall be measured by cross sectional area, perpendicular to the air flow.
- Painting - All grilles, diffusers shall be powder coated in the shade a•proved by the Client / Consultant.

Bare surface area of ducts will be used in calculating the duct measurements. No separate e•tra measurement will be taken for vanes, guides, catchers, splitters etc.

The following procedure for measurement shall be followed for purpose of billing in case of items subject to variation in quantities.

DUCT INSULATION:

TECHNICAL SPECIFICATION FOR NITRILE RUBBER THERMAL INSULATION

Insulation material shall be Closed Cell Elastomeric Nitrile Rubber with aluminium foil laminated on one side.

Density of Material shall be 45 - 70 Kg/m3

Thermal conductivity of insulation material shall not exceed 0.035 W/(m.K) at mean temperature of 0□C as per EN 12667.

The insulation material shall have fire performance such that it passes Class 1 as per BS476 Part 7 for surface spread of flame and also passes Fire Propagation requirement as per BS476 Part 6 to meet the Class 'O' Fire category as per 1991 Building Regulations (England & Wales) and the Building Standards (Scotland) Regulations 1990.

Water vapour permeability shall not exceed 2.9 x 10-14 g/m.s.Pa i.e. Moisture Diffusion Resistance Factor or 'μ' value shall be minimum 12000.

Insulation should have flame spread classification not more than 25 & smoke developed classification of not more than 50 as per ASTM E84-16

Insulation should have anti-microbial property as per ASTM E 2180-07

The insulation material shall have fire performance of V0, HB as per UL 94, 1996. Density of insulation material shall be between 40 to 55 Kg/m3.

The insulation material shall be dust and fibre free.

The insulation material shall withstand maximum surface temperature of +85 Deg.C and minimum surface temperature of 0 Deg.C as per EN 14706.

The Aluminium foil shall be of 12 micron thickness with reinforced glass scrim and weight shall be 70 gsm as per EN 22286, tensile strength shall be 250N/50mm as per ISO 527-3 with elongation of 4% as per DIN 53354.

The material shall have ODP (Ozone Depletion Potential) and GWP (Global Warming Potential) of Zero.

Thickness of the insulation shall be as specified for the individual application.

The insulation material shall be installed as per manufacturer's recommendation. The Proposed Insulation shall be of Self Adhesive type Class O insulation.

Installation:

- Foam Insulation must be installed in accordance with manufacturer's instruction.
- All joints should be butted firmly against each other, seal all joints with overlapping self-adhesive 75mm wide reinforced aluminium tape, procured from the manufacturer of same material as the base insulation.
- Insulate each duct separately, flanges should be insulated with a 120mm wide strip of insulation material, ensuring joints are sealed with 75mm reinforced aluminium foil tape, procured from the manufacturer of same material as the base insulation.
- All supporting hangers should be lined with the same insulation material to avoid excess compression of insulation. (Refer manufacturer's instruction).
- Ensure no air pockets during the installation of the insulation to the duct. Any minor surface cuts should be covered with aluminium foil tape.

TECHNICAL SPECIFICATION FOR ADP FIRE DAMPERS:

Fire Dampers shall be provided as per the drawings and the bill of quantities and shall be at least of 90minutes fire rating of fusible link type.

The damper shall consist of outer frame, damper blades, SS Spring, plated steel linkage, UL stamped fusible linkage, handle & sleeves. The blades & outer frame shall be formed out of 1.6 mm thick GSS as required.

Fire damper blades shall be one piece folded high strength galvanized steel construction. In normal position, these blades shall be gathered and stacked at the frame head providin: maximum air passage and preventing passing air current from noise chatter. The blades shall be held in position through fusible links (UL certified).In case of fire; the intrinsic energy of the folded blades shall be utilized to close the openings. The thrust form closing of the damper shall operate a limit switch mounted in the bottom frame of the fire damper within the duct; closing of this limit switch shall shut off the power supply to the air handling unit stopping all air flow instantaneously.

All Fire dampers shall be complete with factory fabricated & fitted duct sleeves as per manufacturers recommendation. Access doors shall be provided in accordance with the manufacturer's recommendation.

Certificate for Fire performance from CBRI is required. Minimum 2Nos Fusible Link shall be tested at site.

GRILLES, DIFFUSERS & DAMPERS:

All supply air diffusers shall be of Powder coated extruded aluminium sections and removable core type. Volume control dampers shall be provided for all diffusers.

Return air diffusers shall be identical to supply air diffusers except that they do not incorporate volume control dampers.

Supply air grilles shall be of powder coated extruded aluminium construction. They shall be complete with Volume control dampers of aluminium mounted directly on grilles. The vanes shall be 3 mm thick and 25 mm deep horizontal type. The width of the perimeter flanges shall be 25 mm.

Return air grilles shall also be Powder coated extruded aluminium construction. They shall incorporate (only) horizontal vanes, which shall be fixed. The perimeter flanges shall be 25 mm width. The vanes shall be 3 mm thick and 25 mm deep. The pitch of vanes shall be 20 mm.

All dampers shall be louvered dampers (of GI) of robust construction and tightly fitted in epoxy painted MS angle iron frame. They shall be provided with suitable links, levers and quadrants as required for their proper operation, control or setting in any desired position. Dampers and their operating devices shall be made robust, easily operable and accessible through suitable access doors in the ducts / false ceiling. Where required, dampers shall have an indicating device, clearly showing the damper position at all times.

Dampers shall be placed in ducts and at every branch (whether or not indicated on the drawings) for the proper volume control and for balancing the system.

Supply and Return air grilles/diffusers shall be housed in modules which have to be fixed to the false ceiling.

TERMINAL HEPA FILTERS

a. H14 HEPA Class filters as per EN1882 and shall be as specified in the tender drawings and Bill of Quantities.

b. The HEPA filters shall comprise Micro Glass Fiber media and corrugated aluminium separators, the media - separator combination being sealed into aluminium frames. Neoprene or other suitable soft rubber gasket shall be provided on the leaving face of the filter.

c. Wherever necessary the filter shall also incorporate protective screen / grilles on the air directly into the air-conditioned space, thus obviating the need for any air diffusing elem-nt. The protective screen shall be fabricated out of 2 mm thick perforated aluminium sheets, the area of perforation being at least 60%.

d. The filt-rs in the AHU shall be complete with flanged sheet metal holding frames of 16 gauge GI / MSS with corrosion resistant finish.

e. The successful tenderer shall submit a sample of the filter, sheet metal holding frame, as well as protective screen / grilles and get the approval before placing the order.

f. The filters shall have an efficiency of not less than 95% for 0.3 micron particles as determined by PAO test.

g. Each filter shall be subjected to PAO test and a certificate / certificates to the effect that such tests have been conducted shall be furnished by the contractor. The details of the PAO test procedure adopted by the contractors / manufacturers at their works, including the specifications applicable to the aerosol generator, particle counter and other accessories shall be submitted by the vendor.

In addition to the tests carried out on each & every filter at the works, as noted abov-, the contractor shall also carry out performance test of the HEPA filters installation using – again, PAO as challenge. Provisions for carrying •ut the tests including installing necessary connectors/providing tapping for measurements shall be incorporated while carrying out the work.

Tests shall be carried out to methods & practices developed & published by IEST (Institute of Environment Sciences & Technology).

a. The following measurements / tests / checks shall be carried out on all HEPA Filters installed, Tests.

b. Integrity Test (Using PAO Test)

c. Particle count

d. Velocity check

e. Flow rate measurements

CONSTRUCTION OF ANTI STATIC CHEMICAL RESISTANT EPOXY FLOORING ON VDF : MAKE SIKA

ABBREVIATIONS

- **DB : Dry Bulb Temperature**
- **WB : Wet Bulb Temperature**
- **RH : Relative Humidity**
- **NC : Not Controlled**
- **NMT : Not More Than**
- **CFM : Cubic Feet Per Minute**
- **CMH : Cubic Meter Per Hour**
- **AHU : Air Handling Unit**
- **EAU : Exhaust Air Unit**
- **DX : Direct Expansion**
- **VRF : Variable Refrigerant Flow**
- **SP : Static Pressure**
- **GSS : Galvanized Sheet steel**
- **DIDW : Double Inlet Double Width**
- **VFD : Variable Frequency Drive**
- **MOC : Materials of Construction**
- **PA : Pascal**
- **SA : Supply Air**
- **RA : Return Air**
- **RPM : Rotation per minute**
- **TEFC : Totally Enclosed Fan Cooled**
- **TR : Tonnes of Refrigeration**
- **URS : User Requirement Specification**

❖ CLEAN ROOM PANEL WORKS

1. SCOPE OF WORKS

The proposed area shall be provided with a modular Wall Panel & False Ceiling system made of Epoxy Powder Coated Galvanized Sheet Steel with High Density Expanded Polyurethane foam as infill.

2. DESIGN CRITERIA

2.1 PURPOSE

The facility shall be constructed with modular wall panels and ceiling panels, the type that is generally used for clean room application but built stronger to withstand rigors of cross contamination.

2.2 TYPE

- Modular Clean Room Sandwiched Panel Constructed with Epoxy Powder Coated Galvanized Sheet Steel of min 0.8 mm Thickness infilled with high density expanded polyurethane foam. Galvanized Iron Frameworks as per design requirements shall be provided as reinforcement to improve the rigidity of the Panel.

- Doors shall be of the same construction as per the Wall Panel with min 1 mm thickness sheet for Door & 1.2mm thickness for Door Frame.

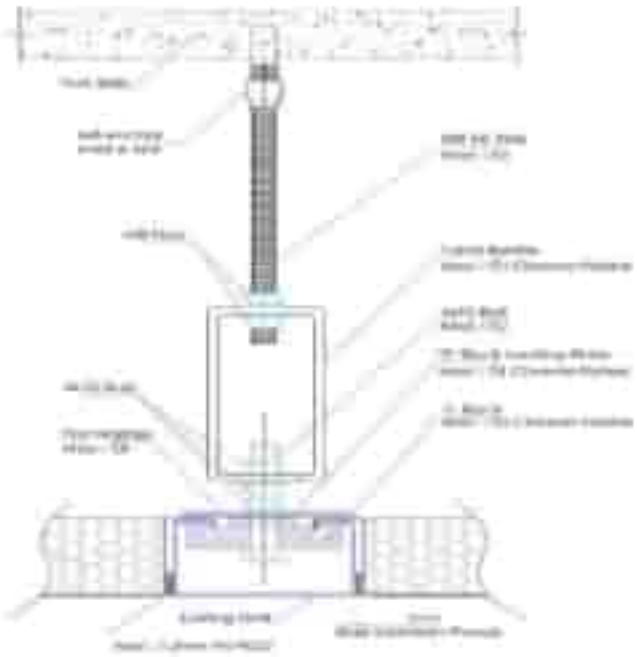
2.3 GENERAL DESIGN REQUIREMENT

- The design Facility is under comfort Air Conditioning, Unclassified area without personnel Air Lock entry.
- The view panels, constructed with double glazing, shall be provided for facilitating good visibility.
- The Doors shall be provided with drop seals & side seals to reduce the leakage rate.
- The wall and ceiling panels for facility construction shall be of the type convenient for penetration for the service lines and utilities and at the same time such penetrations, it should be possible for leak proof sealing.
- All joints to be sealed with silicon sealant. Coving profiles to be used where the wall panel meets the Floor & Ceiling.
- Provision for Fixing Diffuser module, Grille modules & Clean Room Light Fixtures shall be provided in the Ceiling Panels.

3. *GENERAL SPECIFICATIONS*

3.1 Ceiling Grid & Panel Structure

Ceiling system, suitable for clean room applications, complying with international statutory regulations, preferably applicable for a semiconductor industry / electronics industry / pharmaceutical/ Biological, shall have double skinned, insulated, walkable type, load bearing modular panels flush on both sides, supported on heavy duty aluminium profile frame forming reticulated grid structure hanged from steel truss/RCC roof through adjustable threaded HDG tension bolts/expansion bolts, turn buckles, slide fits etc., with necessary openings for HEPA filters, filter housing, grills, supply-return ducts, service pipes, power-control cables, sensors and suitable opening for light fixtures, making openings leak proof with necessary framings, sealing of joints with silicon sealant etc. without any crevice/undulations. The design, fabrication/manufacture, installation should be such that essentially all finishes should ensure all products to be manufactured in the proposed facility are protected from contamination and that all surfaces should permit efficient cleaning, minimize moisture penetration during cleaning. All surface finishes should be impervious, smooth, non-shedding and should withstand repeated application of cleaning materials and disinfecting solutions. Standard height of walkable ceiling from floor level is 2.7 mts. However, this may vary according to the requirement of activity being carried out.



Typical Ceiling Support Details

- Lower skin of ceiling panel - towards clean room side

Minimum 0.8 mm thick Powder Coated GI sheet (Hot dipped with Zinc coating

of 120 gsm), thermo-hardened Epoxy Powder Coated resistant to all mechanical, chemical, climatic aggression, resistant to x-ray or ultraviolet radiation /powder coated with approved colour & finish along with high density expanded polyurethane foam infill density of 40+/- 2 Kg/cu mtr.

• Upper skin exposed to Attic Space
Minimum 0.8 mm thick PCGI sheet, thermo-hardened Epoxy Powder Coated resistant to all mechanical, chemical, climatic aggression, resistant to x-ray or ultraviolet radiation /powder coated with approved colour & finish.

• Ceiling Grid (Only modular type reticulated grid structure)
Heavy duty 16 micron anodized extruded aluminium sections minimum 2.5mm-3.0mm thick, flush with panel on both sides with maximum allowable gap of 4mm filled with silicon, powder coated to match ceiling panel finish with all accessories, clamps, GI/Electroplated nut-bolts etc complete suitable for walkable ceiling with load bearing of 150 - 200 kgs per sq mtrs. All the gaps are to be sealed with silicon sealant and tested for the same. All the gaps above 4mm shall be blanked with similar materials so that the entire ceiling is crevice & projection free. The periphery of the ceiling panel shall be supported on RCC/masonry wall with necessary frames and ceiling joints.

• Suspension System
Minimum M8 or M10 threaded Hot Dip Galvanized rods adjustable suspension with HDG turnbuckle for levelling of 3.0- to 4.0-meter-long rods anchored to RCC beam/slab. The entire grid system shall be grounded to earth as directed. Suitable catwalks shall be provided wherever necessary.

• Insulation
The ceiling panels shall be 50 to 150 mm thick insulated with self-extinguishing high density of expanded polyurethane 40 +/- 2 kg /cu m inclusive of adhesive/glue with appropriate bonding strength etc complete as specified in BOQ.

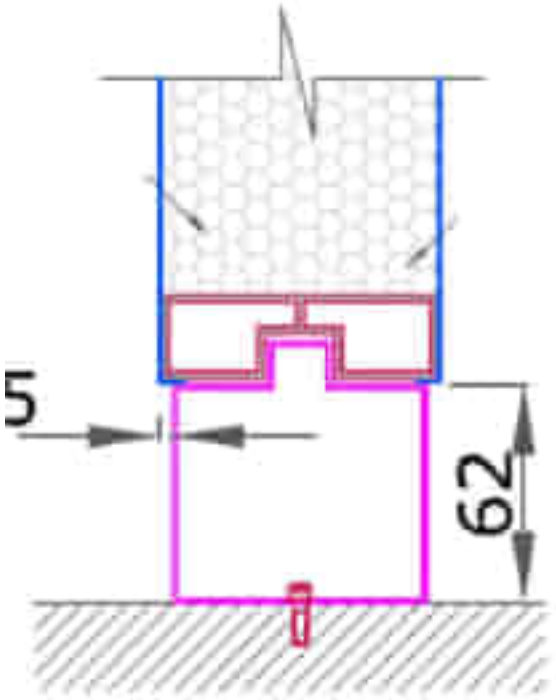
• Cut-outs in panels and Co-ordination with other agencies
Cut outs shall be made in the ceiling panel as described above for HEPA filters, micro filters, cables, etc as per the requirement of the HVAC/Utilities contractor and finishing the cut outs with necessary frames, beadings and Neoprene gaskets on both sides sealed with silicon sealants so as to make the cut out totally leak-proof including powder coated aluminium grill matching with ceiling. It shall be the responsibility of the bidder to coordinate his modular partition erection work with HVAC contractor for ducting cut outs and Utilities contractor for all service pipes and cables.

Panels shall be resistant to the action of usual cleaning agents (detergents and disinfectants) used in pharmaceutical industry. Panels to be provided with plastic foil/protective covering in the processing and installation stages to avoid damages and the wall surfaces to be clean of excess color or oil traces. The above false ceiling gaps adjacent to civil wall and between panels shall be properly sealed with aluminium 'L'-angle properly fastened and properly sealed using FDA approved food grade sealant (between wall and wall panel wherever possible). All the gaps between ceiling elements and wall panels shall be properly sealed with FDA approved food grade sealant.

3.2 WALL PANEL SYSTEM

Wall Panel System suitable for clean room applications, complying with international statutory regulations, preferably applicable for a semiconductor industry / electronics industry / pharmaceutical/ Biological shall have double skinned, self-supported, load bearing modular panels, flush on both sides, supported on heavy duty aluminium profile frame forming reticulated grid structure supported on RCC floor by anchoring heavy duty aluminium profile runner, levelling, fixing coving minimum 75mm high to receive flooring, with intermediate vertical, horizontal and corner frames, top frame connected to ceiling grid along with coving with necessary openings for doors, windows, pass boxes, material hatch, equipment cut out, return/supply ducts, grills, service pipes, power-control cables, sensors, switches etc complete and making openings leak proof with necessary framings, sealing of joints with silicon sealant etc complete rendering the surface crevice and projection free.

The panel shall be thoroughly checked for Vertical Straightness with IR Beams, shall be easy to remove and refit without disturbing the adjoining wall & ceiling panel. Minimum space between two skins of wall panel shall be 50mm for without Inbuilt Raiser & 100 / 150 mm for Inbuilt Raisers. The bidder shall fill the hollow space with high density expanded polyurethane material of suitable density structure to make the panel rigid, sturdy and free of vibrations, and the infill shall be PUF of suitable density. It shall be possible to run wires/cables through hollow box wall frames and fixing of switches. Bidders may please note that panels with tongue & grove joints without box frame shall not be accepted.



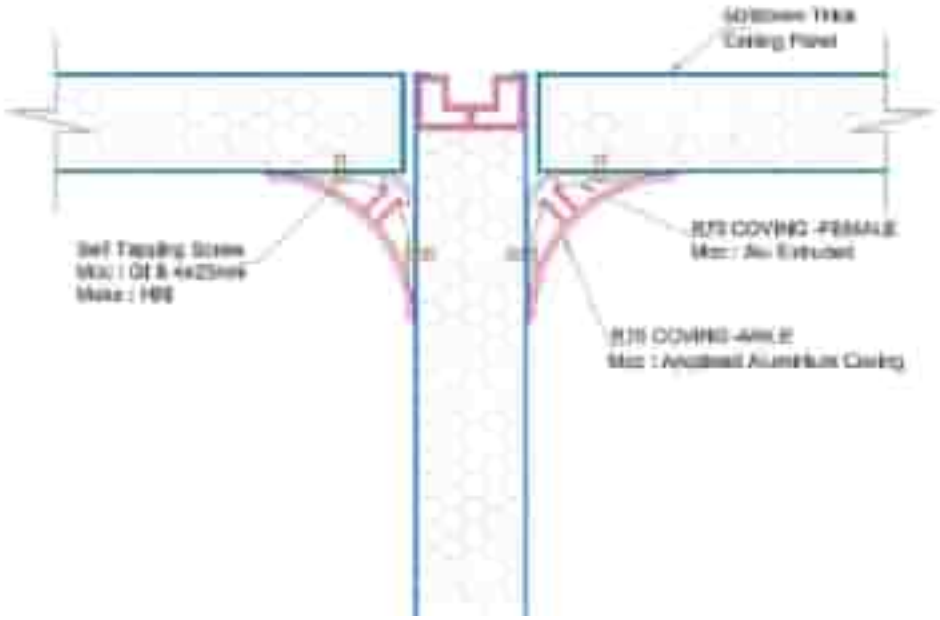
Typical Wall Panel Supports Details

- Wall Panel Frame Double skin wall panel (sandwiched Construction)
  Minimum 0.8mm thick PCGI sheet, thermo-hardened Epoxy powder coated paint resistant to all mechanical, chemical, climatic aggression, resistant to x-ray or ultraviolet radiation /powder coated with approved colour & finish all the gaps above 4mm shall be blanked with similar materials so that entire panel is crevice & projection free.

- Cut-outs in panels and Co-ordination with other agencies
  Cut outs shall be made in the wall panel as described above for doors, windows, cables, service pipes, pass box, hatch, return duct etc as per the requirement of the HVAC/Utilities contractor and finishing the cut outs with necessary frames, beadings and Neoprene gaskets on both sides sealed with silicon sealants so as to make the cut out totally leak proof including powder coated aluminium grill matching with wall panel for return duct. It shall be the responsibility of the bidder to co-ordinate his modular partition er-ction work with HVAC contractor for ducting cut outs and Utilities contractor for all service pipes and cables.

3.3 COVINGS

All joint between wall and wall and wall and ceiling shall be covered with powder coated aluminium coving (color same as the color of the wall and ceiling panel, powder coating shall be 60-80 microns)/anodized aluminium/PVC (wherever specified) as specified with section of radius in range of 50-60 mm. The thickness of coving shall be NLT 2mm. Joint between coving and surface shall be sealed with FDA approved food grade silicon sealant for all areas The coving shall also include 3 D types, both concave and convex sections for connections between 3-way wall panels at the top and wherever specified bottom side of the clean rooms.



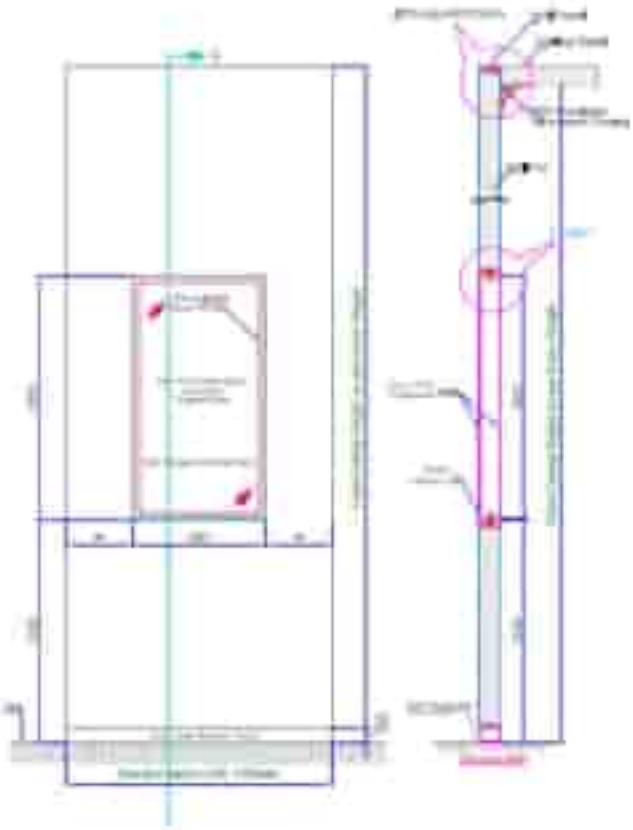
Typical Coving Details

3.4 FALSE WALL PANEL COLUMN/DROP WAYS/SERVICE PANELS

Bidders shall fabricate, supply and erect false columns or drop ways for electrical cables, service pipes, return air, panelling around RCC column etc wherever required with similar material specification as specified under 'Wall Panel System' with round covings and round column edges flush on all sides. The false column shall have (for service panel) two open-able door panels for an easy opening in case of inspection or maintenance. The false panel may be located in the corner, side or free standing in a room. The frame shall be heavy-duty aluminium and sturdy.
Enough to support service pipe clamps. The rate shall include all material, fixtures, labour cost. It shall be paid in square meter.

3.5 WINDOWS:

All windows/view panels with extruded aluminum frame shall be double-glazed and designed to fit flush into th- wall panel system on both side with two minimum 6mm+6mm stratified safety laminated glasses. The plain glass shall be toughened or laminated with transparent film to prevent splattering of glass pieces in case of explosion/breaking. The gap between the glasses shall have an anti-moisture (double Glazed View Panel shall be Vacuum Sealed) system with all around micro-perforation profile with inside silica gel granul-s / molecular sieve. Glazing shall be perfectly flush with the outer surface of the frame and panels. All joints shall be taped and sealed by silicon se-lant. The glass assembly shall be factory assembled and shall be from approved manufacturer. The windows shall be around 1000mm high with 1100mm windowsill and 2100mm window top from finish floor level. This shall be measured in square meter. View Panels shall be coated of approved colour to prevent entry of Ultraviolet light with factory fitted aluminum frame/housing.



Typical Windows Details

3.6 MODULAR CLEAN ROOM DOORS - SINGLE LEAF / DOUBLE LEAF

Modular doors leaves shall be made from both side Epoxy Powder coated (60-80 microns) 0.8 mm thick G.I sheets (hot dipped with zinc coating of 120 gsm) with PUF as infill of density not less than 40 +/- 2 Kg/m3. Specific doors in washing area shall be with PCGI (Powder coated (60-80 microns) 0.8 mm thick G.I sheets (hot dipped with zinc coating of 120 gsm)) +PSS (0.8 mm thick Plain SS 304 sheet smoothed to 240 grit) skins. Door Frame will be made of 1.2 mm thick epoxy powder coated GI sheet or anodized aluminium. Doors shall be provided with necessary stiffeners and rounded aluminium edging to avoid the build-up of particles and to allow the whole surface to be kept perfectly clean.

The panel sides will be reinforced with a perimetral anodized aluminium frame for enhancing the rigidity of the panel. Door profiles to be designed such that no seal joint is needed all around. To minimize the presence of leaks and the accumulation of particles the joint with two points of contact is preferred.

Internal hinges in a 3/4-part construction made from SS 304 with butt ball bearing and counter sunk screw shall be provided. The door will be opened manually and will be closed slowly by a hydraulic retracting mechanism. The door closure shall have a stainless-steel finish/anodized aluminium and should be suitable to work against differential pressure of up to 25 Pascal and lockable at 90° (Dorma make model TS 71 or suitable), the requirement shall be based on the site conditions.

Doors requiring interlocks will be provided with electro-magnetic interlocks. Door leaves shall be provide• with bottom drop seals and the same shall be properly concealed and securely fixed at the bottom of door leaves.

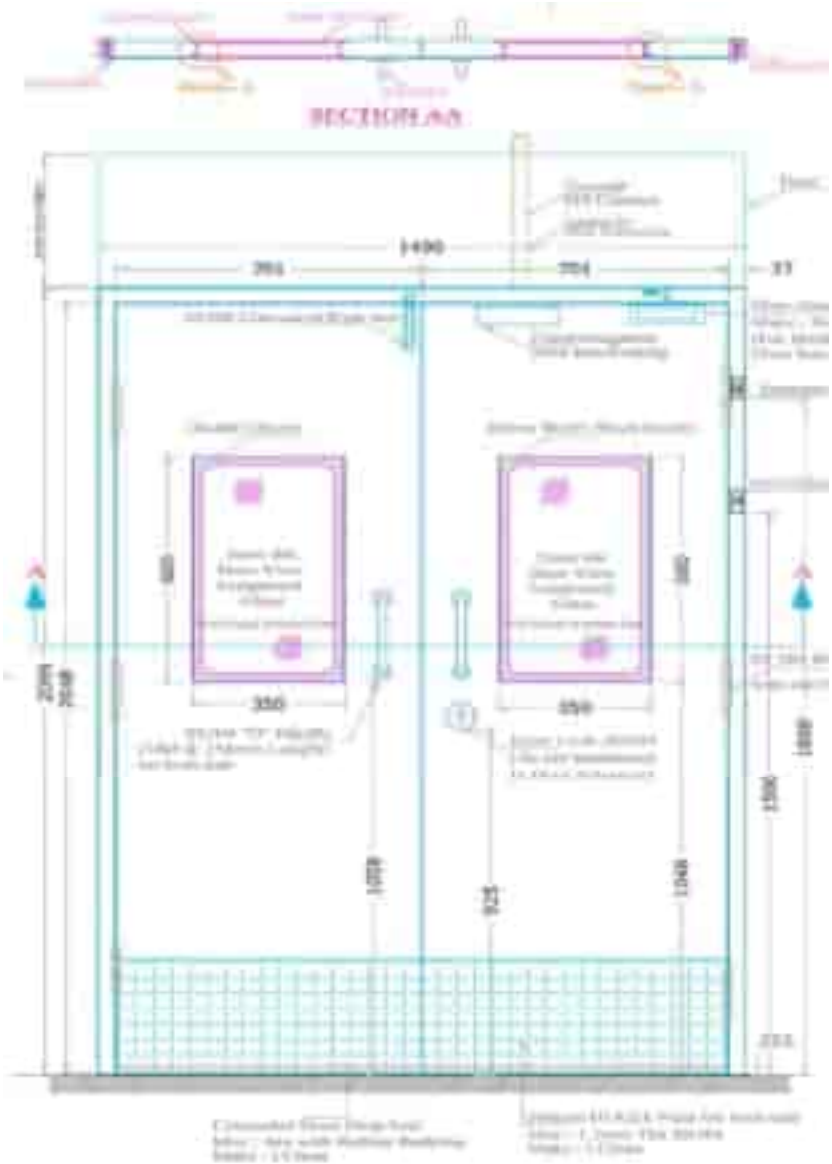
All the doors shall be provided with SS 304 smoothened to 240 grit "D" handles of 18 mm diameter and 254 mm length shall be utilised. Wherever specified lock and key, not less than 1.2 mm thick SS304 smoothened to 240 grit factory fitted kick plates to be provided on both sides to avoid foot shocking. The gap between the frame and the door leaf and the door bottom and the floor shall not be more than 2mm to avoid excess ex-filtration/Infiltration of air from the rooms.

As specified fully flushed double glazed view panel in aluminium framework of minimum 450x600mm size with 6 mm toughened glass (with 4 sided bevelled and smooth edges) & moisture traps using silica gel between panes shall be provided.

All joints between view panel and door panel to be sealed using FDA approved food grade silicon sealant. Double face VHB tapes of required thickness or using FDA approved food grade silicon sealant to be provided on the periphery of the view panel frame to avoid any play between view panel frame and the slot in the door leaf.

In case of damage the window/view panel should be changeable without removing the door panels. The doors shall be provided with tags mentioning the name of the room.

Frosting of the glass/doors without glass to be considered for dress change rooms. View panels with automatic (electrical) frosting shall be considered in need to have basis. Additional accessories such as push plate, concealed tower bolt for double doors etc. shall be considered as per the client's requirements.



Modular Emergency Doors (Red Color) :

Emergency doors shall be made from both side Epoxy Powder coated (60-80 microns) 0.8 mm thick (1.2 mm thick for civil wall) G.I sheets (hot dipped with zinc coating of 120 gsm) with Rockwool as infill of density not less than 96 +/- 2 Kg/m3. Door Frame will be made of 1.2 mm thick (1.6 mm thick for civil wall) epoxy powder coated GI sheet or with anodized aluminium. Doors shall be provided with necessary stiffeners & rounded aluminium edging to avoid the build-up of particles and to allow the whole surface to be kept perfectly clean. To minimize the presence of leaks and the accumulation of particles the joint with two points of contact is preferred. The panel sides will be reinforced with a perimetral anodized aluminium frame for enhancing the rigidity of the panel.

Internal hinges in a 3/4-part construction made from SS 304 with butt ball bearing and counter sunk screw shall be provided. The door will be opened manually and will be closed slowly by a hydraulic retracting mechanism. The

door closure shall be suitable to work against differential pressure of up to 25 Pascal and lockable at 90° (Dorma make model TS 71 or suitable).

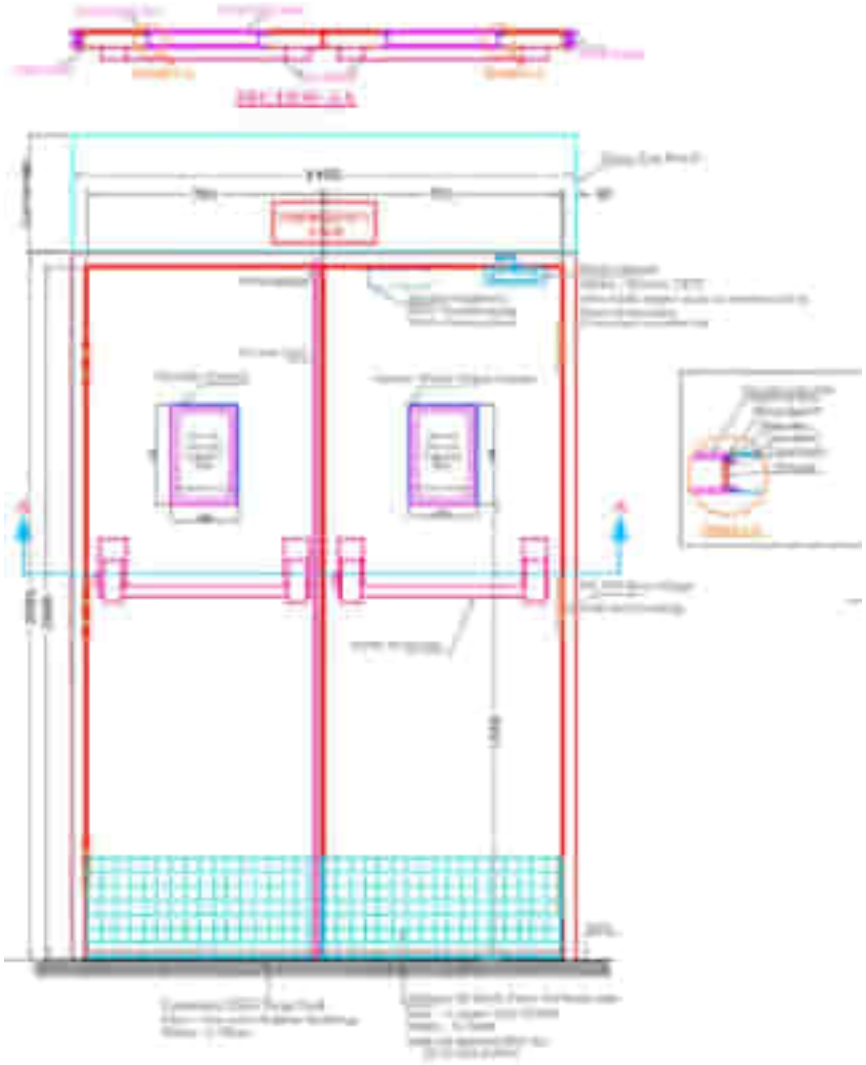
Door leaves shall be provided with bottom drop seals and the same shall be properly concealed and securely fixed at the bottom of door leaves.

All the doors shall be provided with anodized aluminium panic push bars (for double doors pull man latch with rods and lever handle on the other side of the inactive door). Wherever specified not less than 1.2 mm thick SS304 smoothened to 240 grit factory fitted kick plates to be provided on both sides to avoid foot shocking. Double Doors shall be provided with pull man latch and rod, the fastening of the latch to be on the top frame only. The gap between the frame and the door leaf and between the door bottom and the floor shall not be more than 2mm to avoid excess ex-filtration/Infiltration of air from the rooms.

Fully flushed double glazed view panel in aluminium framework of 200x300mm size with 5mm toughened glass (with 4 sided bevelled and smooth edges) & moisture traps using silica gel between panes shall be provided.

All joints between view panel and door panel to be sealed using FDA approved food grade silicon sealant. Double face VHB tapes of required thickness or silicon sealant to be provided on the periphery of the view panel frame to avoid any play between view panel frame and the slot in the door leaf. In case of damage the window/view panel should be changeable without removing the wall panels. The doors shall be provided with tags mentioning the name of the room.

The doors shall be provided with tags mentioning the EMERGENCY EXIT signage in fluorescent sticker/signage from polypropylene sheets/any clean room compatible material.



Typical Emergency Doors Details



- **Modular Doors**

Door's shutter /leaf of 46 mm thickness shall be made from both side Epoxy Powder coated (60-80 microns) 1.2 mm thick G.I sheets (hot dipped with zinc coating of 120 gsm) with high density expanded polyurethane foam as infill of density not less than 40 Kg/m3. Doors shutter /leaf of 46 mm thickness shall be made from both side Epoxy Powder coated (60-80 microns) 1.2 mm thick G.I sheets (hot dipped with zinc coating of 120 gsm) with PUF as infill of density not less than 40 +/- 2 Kg/m3. Door Frame will be made of 1.6 mm thick epoxy powder coated PCGI sheet/anodized aluminium. Doors shall be provided with necessary stiffeners and rounded aluminium edging to avoid the build-up of particles and to allow the whole surface to be kept perfectly clean. To minimize the presence of leaks and the accumulation of particles the joint with two points of contact is preferred. The panel sides will be reinforced with a perimetral anodized aluminium frame for enhancing the rigidity of the panel.

The clean door panels should meet the euro classes' minimum reaction A2-s1, d0: non-combustible for high density expanded polyurethane.

Internal hinges in a 3/4-part construction made from SS 304 with butt ball bearing and counter sunk screw shall be provided. The door will be opened manually and will be closed slowly by a hydraulic retracting mechanism. The door closure (MOC SS 304) should be suitable to work against differential pressure of up to 25 Pascal and lockable at 90°wherever specified.

Doors requiring interlocks will be provided with electro-mechanic interlocks wherever specified.

Door leaves shall be provided with bottom drop seals and the same shall be properly concealed and securely fixed at the bottom of door leaves.

All the doors shall be provided with SS 304 smoothened to 240 grit "D" handles shall be utilized. Wherever specified lock and key, not less than 1.2 mm thick SS304 smoothened to 240 grit factory fitted kick plates to be provided on both sides to avoid foot shocking.

The insulation considered may be sodium silicate film or any other intumescent. Silica gel/suitable desiccant shall be introduced between glazing to arrest humidity. It shall be flush mounted with the wall panel (view panels should be inset within the doors as a single entity).

- **View Panels on Doors**

  View panel with extruded aluminium frame shall be double-glazed and designed to fit flush both side of the door with two minimum 6mm+6mm stratified safety glasses as specified in windows section. The sill level of the door view panel shall match the windowsill height. All the doors shall be fitted with heavy-duty anodized aluminium mat finish/powder coated or stainless-steel hardware, handles, locks, hinges, conceal-d door closure of approved make and size. For double doors, only the active door panel shall be provided with door closure. Gaskets made of approved m-terial running on three sides inside the frame shall be provided for tightness. The doors may be required to swing 90° degrees on opening. Wh-rever specified, doors shall be interlocked with other doors.

- **Doors Interlocking System**

  Provision for Door Interlocking System shall be provided by the Panel Vendor. Since Door Interlocking System is in Instrumentation scope of works. Panel bidder shall coordinate with Instrumentation Vendor for execution of Door Interlocking.

- **Emergency Break Panel**

  Emergency View Glass shall be made in anodized aluminium framework made from d•uble glazed tempered / toughened glass of min 5 mm thk. Glass shall be properly fixed to the frame with VHB tapes, silica gel shall be introduced b/w glazing to avoid ingression of humidity. The total frame shall be properly fastened to the modular panels & all joints shall be sealed with FDA approved food grade silicon sealant. A glass breaking tool of SS304 / Anodized Aluminium shall be provided along with this door & fixed near to the glass on both sides of the room.

- **Pass Boxes**

  Dynamic pass box shall be installed between two different classified area/rooms for material pass through. The purpose is to provide barrier between areas & to sweep away the particulate load if present on surface of object being transferred to more clean area. All dynamic pass boxes shall be Re-circulatory type.

  Dynamic pass box shall be made of minimum 18-gauge SS 304 sheets -nd finished with 240 grit, with internally coved joints & with sandwiched door with double sided view panel and handle in either floor mounted or wall mounted construction.

  The DPB shall provide an ISO Class 5 (0.45 ± 20% m/s) at the workspace air cleanliness or to highest cleanliness grade as identified by process requirements. Minipleat HEPA filter type H-14 filter shall be used and the blower will be of

permanently lubricated type. Fully flushed/Fully protected CFL and UV lights (wherever specified) shall have protection with SS cage and shall be interlocked (electromagnetic type) with the pass box door. The unit also shall be provided with audio and visual (High intensity bar LED's) alarm for alerting the personnel of an open/unattended door & audio alarm for blower failure. Visual indication for UV lamps (pass box utilizing UV light), emergency push buttons on both sides, manual blower switch, separate manual switches for UV (pass box utilizing UV light) and CFL lights, SS304 smoothened to 240 grit grills for air suction in the cleaner room side etc. shall be provided. The noise level permissible for pass boxes shall not exceed 60 dB at 1-meter distance.

The pass box door opening will not only be with interlock but also with timer control (timer to display both minutes and seconds or suitable) which can be manually set. The timer display and setting keypad shall be available on both sides of the pass boxes above the door. Th- control of lights doors and alarms shall be done by a microprocessor controller. All wall mounted pass boxes shall be properly supported from the flo•r with SS304 leg and base plate and properly fastened to the floor with SS304 bolts. Pass box openings in the wall panels to be suitably covered and anodized aluminium covings to be provided between pass
box and wall panels. All door hinges handle etc. shall be made from SS304 smoothened to 240 grit.

All floor mounted pass boxes will have a height of side wall panels by excess of 25 mm for being able to be matched with the finished floor level. Floor mounted pass box shall be provided with door bottom seal for adjusting the leakage of air from the pass box. All pass box to be provided with an -xternal flange of minimum 25mm width flushed with the face of the pass box, which is flushing to wall panel.

By default, the UV light inside the pass box to be switched on when both doors are closed which will be done by the user on activation of the manual switch. An interlock shall be incorporated by such that UV light shall switch off and CFL light switch on if any door of the pass box is opened. The gap between the frame and the door leaf and the door bottom and the floor shall not be more than 2mm to avoid excess ex-filtration/infiltration of air from the pass box.

The power cable from the pass box to be suitably drawn through the enamel painted MS conduits in the wall panels. No separate sockets shall be provided within the room.

The following Accessories shall be available with the dynamic pass boxes:

- Magnehelic gauges across HEPA (0-750 Pa) & Pre-Filter (0-300 Pa).
- Door with double glazed view panel (minimum 5 mm thick toughened glass)
- UV light with Hour meter the light minimum hour life should be 5000 hr. & light emitted shall be short-wave UV radiation with a peak at 253.7 nm (UV-C) for germicidal action. The hour meter should be able to be manually re-set.
- Normal CFL (Lux level not to exceed 300 Lux).
- Pre filter : EU4 Grade (SS 304 frame with Non-Woven Polyester media) with initial
  pressure drop of not more than 60 Pa and final pressure drop of not more than 120 Pa.
- Final Minipleat HEPA filter : Separator less type H14 Grade (Aluminium anodized
  frame with micro fibre glass media) with initial pressure drop of not more than 250 Pa and final pressure drop of not more than 500 Pa.
- Blower and motor assembly: Permanently lubricated type blower with Aluminium Blower frame with external rotor with integrated electronics and the complete unit statically and dynamically balanced in two planes. The motor shall be with IP 54 protection and with maintenance-free ball bearings and permanent lubrication.
- Internal SS round pencil coving.
- DOP upstream port (and injection port if applicable) for HEPA filter

Static Pass Boxes (SPB)

- These pass boxes shall be installed between noncritical rooms for material transfer.
  Static pass box shall be made of minimum 18 gauge SS 304 sheets and finished with 240 grit, with internally coved joints & with sandwiched door with double sided view panel and handle in either floor mounted or wall mounted construction.
- Fully flushed/Fully protected CFL and UV lights shall have protection with SS cage and shall be interlocked (electro-magnetic type) with the pass box door. The unit also shall be provided with audio and visual (High intensity bar LED's) alarm for alerting the personnel of an open/unattended door.
- The pass box door opening will not only be with interlock but also with timer control (timer to display both minutes and seconds or suitable) which can be manually set. The timer display and setting keypad shall be available on both sides of the pass boxes above the door. control of lights doors and alarms shall be done by a microprocessor controller. Visual indication for UV lamps, emergency push buttons on both sides, separate manual switches for

- UV and CFL lights etc. shall be provided. All wall mounted pass boxes shall be properly supported from the floor with SS 304 leg and base plate and properly fastened to the floor with SS304 bolts. Pass box openings in the wall panels to be suitably covered and anodized aluminium covings to be provided between pass box and wall panels. Magnetic latches shall be provided for keeping the doors closed. The unit also shall be provided with audio and visual (High intensity bar LED's) alarm for alerting the personnel of an open/unattended door. Pass box openings in the wall panels to be suitably covered and anodized aluminium covings to be provided between pass box and wall panels. All door hinges handle etc. shall be made from SS304 smoothened to 240 grits. Pass box to be provided with an external flange of minimum 25mm width flushed with the face of the pass box, which is flushing to wall panel. All floor mounted pass boxes will have a height of side wall panels by excess of 25 mm for being able to be matched with the finished floor level.

By default, the UV light inside the pass box to be switched on when both doors are closed which will be done by the user on activation of the manual switch. An interlock shall be incorporated such that UV light shall switch off and CFL light switch on if any door of the pass box is opened. The gap between the frame and the door leaf and the door bottom and the floor shall not be more than 2mm to avoid excess ex filtration/infiltration of air from the pass box. The power cable from the pass box to be suitably drawn through the MS conduits in the wall panels. No separate sockets shall be provided within the room.

The following accessories shall be provided with the static pass boxes:

- Door with double glazed view panel (minimum 5 mm thick toughened glass).
- UV light with Hour meter. The light minimum hour life should be 5000 hr & light emitted shall be short-wave UV radiation with a peak at 253.7 nm (UV-C) for germicidal action. The hour meter should be able to be manually re-set.
- Normal CFL (Lux level not to exceed 300 Lux).
- Internal SS round pencil coving

3.7 PERFORMANCE REQUIREMENTS OF WALL AND CEILING PANELS:

Acoustics: Noise level inside clean rooms shall be less than 55 ± 5 dBA and in other areas IS 65 ± 5 dBA.

Mechanical Strength: The wall panel system should be sturdy enough to withstand a Hanging load of 200 kg /lm.

Surface Resistivity: The surface Resistivity should not be more than 10-12 ohms /sq, essentially to avoid static build up during cleaning of panels resulting in the panel surface attracting the dust particles.

Air Tightness: The clean room system as a whole should comply with the pressure drop of not more than 0.0035 cfm /sq ft ın a range of 10 to 25 Pa and 0.065 in the range of 25 to 50 Pa.

Colour Retention:

There should be no change in the color of the panels and entire assembly after testing for 1000 hrs at 70 - 80 * C.

ABBREVIATION

ACS	Access Control System
AHU	Air Handling Unit
BOQ	Bill of Quantities
CCTV	Closed Circuit Television
cGMP or GMP	Current Good Manufacturing Practises
CFM	Cubic Feet per Minute
CMH	Cubic Metre per Hour
CNC	Controlled but Not Classified
CUC / CNC	Controlled Unclassified / Controlled not Classified
dBA	Decibels
DBT	Dry Bulb Temperature
DIS	Door Interlock System
DQ	Design Qualification
EH&S	Environment, Health & Safety
ELV	Extra Low Voltage
FAT	Factory Acceptance Test
FF	First Floor
FPS	Fire Protection System
FRLS	Fire Retardant Low Smoke
GA	G-neral Arrangement
GBPS	Giga bite per second.
GF	Ground Floor
GFC	Good for Construction

GI	Galvanised Iron
GLP	Good Lab Practice
GSS	Galvanised Steel Sheet
GST	Goods and Services Tax, India
HDPE	High-Dens Information technology Polyethylene
HEPA	High Efficiency Particulate Arresting Filter
HVAC	Heating, Ventilation and Air Conditioning
ID	Identification
IP	Ingress Protection
IP	Internet Protocol
IPQC	In Process Quality Control
ISO	International Organization for Standardization
IT	Information technology
IQ	Inst-llation and Operational Qualification
MOC	Material of Construction
MCP	Manual Call Point
Max	Maximum
MHE	Material Handling Equipment
Min	Minimum
NA	Not Applicable
NC	Not Controlled
NFPA	National Fire Protection Association
NMT	Not More Than
OQ	Operational Qualification
PA	Pascal
PEB	Pre-Engineered Building
PFD	Process Flow Diagram
PQ	Performance Qualification
PRD	Process Research & Development
QA	Quality Assurance
QAD	Quality Assurance Department
QC	Quality Control
QMS	Quality Management System
R&D	Research and Development
RA	Return Air
RAR	Return Air Riser
RCC	Reinforced Cement Concrete
RFQ	Request for Quotation
RH	Relative Humidity
SAT	Site Acceptance Test

SOP	Standard Operating Procedure
SP	Static Pressure
SS	Stainless Steel
TBA	Technical Bid Analysis
TOR	Terms of Reference
URS	User Requirement Specifications
VFD	Variable Frequency Drive
WB	Wet Bulb Temperature
WHO	World Health Organization

DATED: 19.11.2026

RAMAN RESEARCH INSTITUTE

C.V. Raman Avenue, Sadashivanagar, Bengaluru - 560080

Supply, Installation, Testing and Commissioning (SITC) of Air Handling Units (AHUs) with VRF/VRV System including all Allied HVAC works suitable for class 100000 clean room conditions for LASE Lab at RRI Campus, Bengaluru

Item Rate Tender & Contract for works

NIT No: RRI/EB/HVAC/PT-19/2026-27, Dated: 17.11.2026

TENDER DOCUMENT- PRICE BID

<u>IMPORTANT NOTE</u>: THE PRICE BID SHALL BE SEPARATELY SUBMITTED IN *COVER ii.* AND SHALL NOT BE PUT ALONG WITH TECHNICAL BID *COVER i.* IN WHICH CASE THE ENTIRE TENDER IS SUMMARILY REJECTED.

RAMAN RESEARCH INSTITUTE

C.V. Raman Avenue, Sadashivanagar, Bengaluru – 560080

NAME OF WORK**:** Supply, Installation, Testing and Commissioning (SITC) of Air Handling Units (AHUs) with VRF/VRV System including all Allied HVAC works suitable for class 100000 clean room conditions for LASE Lab at RRI Campus, Bengaluru

TENDER DOCUMENT- PRICE BID

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03	List of Approved Makes	Enclosed

RAMAN RESEARCH INSTITUTE, BENGALURU

GOVERNMENT OF INDIA

NOTICE INVITING TENDER

Date: 19.11.2026

Tender Notice No. **RRI/EB/HVAC/PT-19/2026-27** Dated: 17.11.2026

1. On Behalf of the Director, Raman Research Institute, sealed, item-rate tenders are invited for the following work.

Sl. No	**Description**	Details
1.	Title of work	Supply, Installation, Testing and Commissioning (SITC) of Air Handling Units (AHUs) with VRF/VRV System including all Allied HVAC works suitable for class 100000 clean room conditions for LASE Lab at RRI Campus, Bengaluru
2.	Estimated cost put to tender	**RS. 1.20 Crores** inclusive of prevailing GST
3.	Period of completion in months reckoned from the date of issue of work order.	75 days
4.	Cost of tender document	Rs.590/- inclusive of GST
5.	Period during which the request for tender document can be obtained.	19/11/2026 to 10/12/2026
6.	Last date and time for receiptof tenders.	10/12/2026 Upto 4.00PM
7.	Due date and time of openingof tenders.	11/12/2026 at 4.00PM
8.	Earnest money deposit (EMD)	Rs. 2,40,000/-

PRICE BID

SCHEDULE OF QUANTITIES



Compliance with Approved Makes List

The Tenderer shall strictly adhere to the Approved Makes List enclosed with this Financial Bid while quoting the rates for all items specified in the BOQ.

The Tenderer shall quote only the make/brand specified in the enclosed Approved Makes List against the respective BOQ item. The Tenderer shall carefully verify the Approved Makes List before submitting the Financial Bid and ensure that the make/brand quoted for each item is in full conformity with the approved list.
No alternative, equivalent, substitute, or non-approved make/brand shall be quoted or supplied without the prior written approval of the Competent Authority.

Important Note:
Any deviation from the Approved Makes List shall result in summarily rejection of the bid, as decided by the Competent Authority. No further correspondence is entertained in this regard.

The Tenderer shall ensure that the make/brand quoted in the Financial Bid shall be the same make/brand supplied, installed and commissioned during execution of the work. Any change of make/brand after submission of the bid shall require prior written approval of the Competent Authority.

The Approved Makes List is enclosed separately shall form an integral part of the tender document, and compliance with the same shall be mandatory for the Tenderer.

Name of the work: Supply, Installation, Testing and Commissioning (SITC) of Air Handling Units (AHUs) with VRF/VRV System including all Allied HVAC works suitable for class 100000 clean room conditions for LASE Lab at RRI Campus, Bengaluru

PART - A

SCHEDULE OF QUANTITY FOR HVAC WORKS

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
1	**VRF WORKS**							
1.1	**VRF OUTDOOR UNIT**							
	Design, Supply, Installation, Testing and Commissioning of the following VRF Condensing Units (Cooling ONLY unit) of capacities rated at 38 deg C ambient DBT & 23 deg C indoor DBT. conditions with necessary interlocks & with R410A Refrigerant. The capacity calculation along with performance and power consumption curves, deration / correction factor curves / charts for indoor temperature and piping derations must be submitted. Condensing units equipped with highly efficient DC Inverter type variable speed compressors (All compressors) with acoustic enclosure for low noise, condenser coil & fins provided with anti-corrosive treatment, necessary accessories for oil separation, moisture removal, flow control, interconnecting piping, low noise condenser air fan, electrical and microprocessor based panel, interconnecting cabling and any other related items as per the manufacturers standards to be included, all housed inside a weather-proof cabinet suitable for exposed installation on terrace.							
	The control panel must be 100% compatible with BMS. The units must also be provided with self addressable control system for control of indoor & other outdoor machines. The quoted price shall be inclusive of full charge of additional refrigerant gas. Condensor coil guard shall be provided.							

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
	VRV / VRF condensing units for the below stated machines shall be as per the specifications. This shall include the nitrogen leak testing, oil charging, vaccumisation, MS base platform for condensing unit complete with epoxy painting, vibration isolation pads, support hangers, railing, brackets etc and other accessories as per the specs & Tender drawings along with lifting & shifting to respective position.							
	ODU-01 AHU 1, 90 HP (30HP *2 Nos Working + 22HP * 1 No Stand By)	1	Set					
	Rate in words:							
1.2	**AHU KIT /CONTROL KIT**							
	The Vendor to include appropriately sized AHU kit meeting the AHU schedule, VRF schedule & refrigerant pipe schematic. The Installation of the AHU kit near the AHU to be coordinated with the AHU Vendor , so as not to damage the AHU panel & to meet the aesthetic requirement.							
	Rate in words:							
1.2.1	Supply, Installation, Testing and Commissioning of Expansion Kit (EEV) including wiring as required for AHU.	1	Sets					
	Rate in words:							
1.2.2	Supply, Installation, Testing and Commissioning of the Control Kit including wiring as required for AHU.	1	Set					
	Rate in words:							

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
1.2.3	Supply, Installation, Testing and Commissioning of Corded Remote controllers for AHU & Ductable indoors.	1	Nos					
	Rate in words:							
1.3	**REFRIGERANT 'Y' / 'T' JOINTS**							
1.3.1	Supply, Installation, Testing and Commissioning of Refrigerant "Y" / "T" joints with insulation, as recommended by manufacturer, suitable for the combination of indoor and outdoor machines based on Tender BOQ, Specification & drawings.	6	Sets					
	Rate in words:							
1.4	**ISOLATION VALVES**							
1.4.1	Supply, Installation, Testing and Commissioning of Suction & Liquid line Isolation valve for ODU's (1 Set per Outdoor unit).	3	Sets					
	Rate in words:							
1.5	**VRF COPPER PIPING WITH INSULATION**							

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
	Supply, installation, testing and commissioning of refrigerant piping using eddy current free Copper pipes and fittings like elbows, couplers, tee joints, brass fittings, "U" loops, expansion loops etc. Insulation of pipes using 13 mm thick upto 19 mm Cu Pipe & 19 mm thick above 19 mm Cu pipe Nitrile rubber insulation with factory applied reinforced aluminium foil facing on oneside, material having class "O" for fire properties, structural clamps with hard PVC pipe sleeves under the clamps to protect insulation at supports, tagging to enable tracing connectivity to respective units as per shop drawings to be generated by contractor and approved by Client. (The Vertical copper pipe droppings shall be covered with additional protection by slit PVC tube or pipe). Supports consisting of Open GI Perforated cable tray & female anchor fasteners with full threaded GI rods, all external piping insualtion shall have ployshield wrapping & run in 16g GI powder coated covered cable tray. Submission of test reports in approved format forms a part of this item scope.	100	Rmtrs					
	Making up of any leakages occuring during testing (600 PSI)/ commissioning / first calender year from handing over, including supply, labour, consumables, refrigerant, top up, oil top up and incidental expenses also forms a part of the scope covered under this item.							
	Rate in words:							
1.5.1	Powder coated Covered cable tray of necessary size made of 16G GI sheet with support to protect refrigerant piping with insulation at terrace, wherever exposed.	30	Rmt					
	Rate in words:							

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
1.5.2	Open GI Perforated cable tray of necessary size with supports for Internal copper piping located above false ceiling / in shafts.	20	Rmt					
	Rate in words:							
1.6	**COMMUNICATION & CONTROL CABLES**							
	Supply, Installation, Testing and Commissioning of Communication Cabling with necessary PVC Conduit, (Suitably layed & tighed with PVC ties on copper piping cable trays to connect outdoor units with respective indoor units, AHU Control Kit & Communication cable between VRF ODU to BACNET).							
1.6.1	(2 Core x 1.5 sqmm Shielded)	85	Rmt					
	Rate in words:							
1.6.2	4 Core x 25 sqmm Copper	30	Rmt					
	Rate in words:							
1.7	**MCCB**							
1.7.1	100 Amps 4P MCCB, 16KA, ON / OFF / Trip indication lamp with weather proof (IP65) Metal enclosure. Fixed on wall or on required MS angle support with all its accessories as per specifications.	3	Sets					
	Rate in words:							
1.8	**EARTHING**							
1.8.1	Supply, laying, testing and commissioning of Earthing 1 Run 6 Sq mm copper cable with required accessories like clamps, PVC insulators, PVC sleeves and bolts & nuts.	30	Rmt.					
	Rate in words:							

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
2.0	**ELECTRICAL LIGHTING**							
a	Supply and Installation of Concealed type clean room Motion sensor lightings with wiring and Swtich Socket.	1	Lot					
	Rate in words:							
b	Supply and Installation of Industrial swtich socket with electrical wiring.	1	Lot					
	Rate in words:							
c	Supply and installation of reliable ESD chair.	2	Nos					
	Rate in words:							
2.1	**HVAC ELECTRICAL (Till our ahu control panel Main cable - By Electrical Vendor Scope)**							
	Supply, laying, testing and commissioning of Power Cable 1100V grade, XLPE insulated FRLS outer sheathed unarmoured Aluminium / Copper conductor cable as per specifications. with end termination of heavy duty double end compression brass cable gland,tapping, crimping, etc. from VRF isolator panel (MCCB) to VRF unit. The cabling shall be layed and tightened with PVC ties on suitable supports, well supported at specific intervals .							
a	3 Core x 16 sqmm Copper armoured cable For AHU(40 Meter per AHU).	40	Rmtrs					
	Rate in words:							
b	4 Core x 10 sqmm Copper armoured cable For Electrical Duct heater).	60	Rmtrs					
	Rate in words:							

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
c	Supply and Laying of Control cabling of Size 4 C x 1 Sq mm for View lamp and Limit swtich.	80	Rmtrs					
	Rate in words:							
d	Supply and Laying of green copper wire for Earthing of equipments.6SQMM	40	Rmtrs					
	Rate in words:							
e	Supply, installation, Testing & commissioning of Factory fabricated GI perforated type cable tray made out of sheet steel including all mounting accessories.up to 200mm wide perforated type cable tray.	50	Rmtrs					
	Rate in words:							
f	Supply, installation, Testing & commissioning of Factory fabricated GI perforated type cable tray made out of sheet steel including all mounting accessories.up to 100mm wide perforated type cable tray.	50	Rmtrs					
	Rate in words:							
g	Supply and Installation of Elctrical control panel for AHU Motor interlocking with VRF out door Units with VFD (15kw x 2 & 40KW HEATER.	1	No					
	Rate in words:							
h	Supply & Fixing End termination for above cables with suitable glands & Lugs.	20	No					
	Rate in words:							

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
i	Supplying, installing and testing approved make 25 mm dia. PVC conduits on wall / ceiling complete with accessories like, Collars, Bends etc.	40	Rmtrs					
	Rate in words:							
	Total							
	Add GST @ 18%							
	Grand Total							
Total Amount in words:								

Number of corrections:		**Signature of the Contractor:**
Number of overwritings:		
Number of additions:		

Name of the work: Supply, Installation, Testing and Commissioning (SITC) of Air Handling Units (AHUs) with VRF/VRV System including all Allied HVAC works suitable for class 100000 clean room conditions for LASE Lab at RRI Campus, Bengaluru

PART - B **SCHEDULE OF QUANTITY FOR CLEAN ROOM PANEL WORKS**

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
	NOTE							
1	**CLEAN ROOM FALSE CEILING**							
	False ceiling panels are designed to fit within each other and suspended by threaded tension bars with adjustable turnbuckles fastened to the overhead support at fixed intervals , Standard Ceiling Panels have a composite construction of two skins of powder coated GI over a GI frame work with a sealed and insulated interior. 150-200 Kg per sq. mtr load bearing(*vendor to mention minimum load bearing capacity of panel).							
1.1	**50mm DOUBLE SKIN WALKABLE FALSE CEILING**							

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
	Supply and Installation of 50mm Double Skin Walkable False Ceiling made of 0.8 mm both Top & Bottom Epoxy based powder coated (60-80 microns) GI Sheets (Hot dipped with Zinc Coating of 120 gsm) with mounting accessories, Polyurethane foam infill (40 +/-2 Kg/m3). False ceiling support rods length shall be suitable to site condition. Do refer to the technical specification provided in the tender. Note: 1. All ceiling joints and gaps between panel to panel, ceiling elements (such as HEPA module, diffusers, pipe & electrical drops etc.) etc. to be sealed using FDA approved food grade silicon sealant of same or nearest colour as panel. The gap above panel to civil wall shall be properly closed with aluminium 'L' angle secured properly between civil wall and panels. All the gaps between panel to panel shall be closed with aluminium sheets. All the gaps between ceiling elements and ceiling panel shall be sealed using FDA approved food grade silicon sealent of the same colour as the panel.	85	Sqmtr					
	2. Colour of the ceiling panel as decided by client 3. Joint width between panels shall be 3-4 mm only.							
	Rate in words:							
2	**CLEAN ROOM WALL PANELS**							

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
	Standard wall partitions are a composite construction of two skins over a GI frame work with sealed and insulated interior. Standard panel dimensions are ----mm. Standard panels have an overall thickness of ---- mm. The self supporting internal walls are constructed with an interior GI frame work. The Partition seams are sealed by FDA approved food grade silicon sealant of same or nearest colour with a perfectly flush finishing. Infill insulation material is sandwiched between the two skin layers and sealed from the exterior by the GI frame work. Do refer to the technical specification provided in the tender. Note: 1.All ceiling joints and gaps between panel to panel, ceiling elements (such as HEPA module, diffusers, pipe & electrical drops etc.) etc. to be sealed using FDA approved food grade silicon sealant of same or nearest colour as panel. The gap above panel to civil wall shall be properly closed with aluminium 'L' - angle secured properly between civil wall and panels.							
	All the gaps between panel to panel shall be closed with aluminium sheets. All the gaps between ceiling elements and ceiling panel shall be sealed used FDA approved food grade silicon sealant of the same colour as the panel 2. Colour of the ceiling panel as decided by client 3. Joint width between panels shall be 3-4 mm only.							
2.1	**50mm THICK DOUBLE SKIN WALL PANEL**							

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
	Supply and Installation of 50mm thick double skin wall panel made of 0.8mm thickness epoxy based Powder coated (60-80 microns) G I sheet (Hot dipped with Zinc Coating of 120 gsm) on both sides with mounting accessories. Polyurethane foam infill (40 +/-2 Kg/m3).	130	Sqmtr					
	Rate in words:							
2.2	**100mm THICK DOUBLE SKIN WALL PANEL**							
	Supply and Installation of 100mm thick double skin wall panel made of 0.8mm thickness epoxy based Powder coated (60-80 microns) G I sheet (Hot dipped with Zinc Coating of 120 gsm) on both sides with mounting accessories, Polyurethane foam infill (40 +/-2 Kg/m3).	22	Sqmtr					
	Rate in words:							
3	**CLEAN ROOM COVINGS**							
	Extruded Aluminum Powder Coated clip on type covings of 75mm radius for Panel to Panel and Panel to Ceiling.							
3.1	Horizontal & Vertical powder coated Coving	125	Rmtr					
	Rate in words:							
3.2	C-Channel powder coated	40	Rmtr					
	Rate in words:							
3.3	90° Corners powder coated	50	Rmtr					
	Rate in words:							

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
3.4	1/4th Spheres Powder Coated	22	Nos					
	Rate in words:							
3.5	1/8th Spheres Powder Coated	6	Nos					
	Rate in words:							
4	**CLEAN ROOM DOORS**							
	Doors are designed to fit flush into the wall panel system on both sides and are supplied in different dimensions. Doors are fabricated from galvanized iron sheets duly epoxy powder coated (60-80 microns) & with Polyurethane foam as infill. Shutter has sheet thickness of 1mm and the frame of 1.2mm. Jam depth of door shutter inline with adjacent panel thickness and shutter width of 44mm. Doors are available in various sizes as per the requirement, door sizes mentioned are the clear openings required between the frames. The following accessories are a part of the door: Note: 1. All joints between view panel and door panel to be sealed using FDA approved food grade silicon sealant of the same or nearest colour as the panel. 2. Colour of the door panel: Vendor to provide options. 3. Double face VHB tapes of required thickness or silicon sealant to be provided on the periphery of the view panel frame to avoid any play between view panel frame and the slot in the door leaf.							

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
	Shutter Thickness: 44 mm thick Stainless steel hinges (to be dorma make) Door shutter should be with minimum leakage (*vendor to specify the gap all around the shutter) Stainless Steel 'D' type of handles on pull side Stainless steel push plates on push side with 0.8mm thick or ebow operated 'L' handle Dorma make Heavy Duty Concealed door closure Concealed double glazed Vaccumized View panel along with self adhesive tape and silicon sealant (500mmWx750mmH) with 6mm thick toughened glass and black border. Mortice dead lock (ML100D) with both Side Key Operation Cylinder-Dorset Concealed Flush Bolt Body with rod Guillote Gasket at bottom for Single Door Guillote Gasket at bottom for Double Door Stainless Steel kick plates on both sides of Door of 1.2mm thick with 300mm height for material transfer doors for Single Door. Stainless Steel kick plates on both sides of Door 1.2mm thick with 300mm height for material transfer doors for Double Door.							
4.1	**DOOR**							
4.1.1	900 X 2100 mm (Clear Opening) Single door without window	1	Nos					
	Rate in words:							
4.1.2	1500 x 2100 mm (Clear Opening) Double door with window - Equal	1	Nos					
	Rate in words:							

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
4.2	**EMERGENCY DOORS**							
4.2.1	900 X 2100mm (clear opening) single door with window	1	Nos					
	Rate in words:							
5	**CUTOUTS FOR ELECTRICAL & HVAC GRILLS, LIGHT FIXTURES ETC.**							
5.1	Frame Work for Wall Panel Cutouts	25	Nos					
	Rate in words:							
5.3	Frame work for False Ceiling Cutouts for Electrical & HVAC	50	Nos					
	Rate in words:							
5.4	PVC Conduit for Electrical Cables / Data Cables of 25mm dia	50	rmts					
	Note : Electrical details are unavailable at the moment, hence cutouts, backboxes and conduits for the same are not incorporated in the BOQ							
	Rate in words:							
6	**INBUILT RAISER**							

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
	Supply and Installation of wall panel inbuilt Return Air Risers of 0.8 mm thick GI sheet (hot dipped with zinc coating of 120 gsm), complete with four side bevelled SS 304 Perforated Grille with high power magnet for holding in position, low leakage Aluminum Volume control damper & G4 Filter in aluminium frame work with proper fixing arrangement & fastnening using SS 304 Dome nuts. Four side 13 mm thick Aluminium foil faced physically crosslinked closed cell XLPE thermally insulated duct connector piece with a flange & a counter flange (of 30mm width, 3mm thick 2 coats epoxy painted MS) to be provided above the top of the false ceiling for HVAC duct connection. Do refer to the technical specification in the tender.							
	Note:							

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
	1. Return air risers of 80mm width to be provided with a minimum of 15mm PIR board insulation in the rear side of riser, within the wall panel. 2. Risers with adjacent ceiling heights to extend minimum 200mm high above the top of the false ceiling with minimum 40mm flanges (MS painted with 2 coats of 3mm thick epoxy paint). Risers with adjacent civil wall to extend to minimum 400mm and blinded, a right angled connector piece of minimum 200mm length with minimum 40mm flange to be provided. All the extensions and exposed parts to be properly insulated. 3. Vendor to provide the Technical Data sheet of the filters with all necessary test certificates for each filter. 4. Price shall include the cost for the cutout in the riser panels for fixing the grille and the filter, wall to wall covings, wall to ceiling coving and wall to floor coving. 5. Refer Tender drawing & Tender Specification							
6.1	600 X 100 mm Inbuilt Raiser	1	Nos					
	Rate in words:							
6.2	900 X 200 mm (External Raiser)	8	Nos					
	Rate in words:							
7	**AIR SHOWER**							
	Type - Air Shower							
7.1	External Dimension mm (L X W X H) -	1	Nos					

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
	Internal Dimension mm (L X W X H) - 750 x 750 x 2000 Material of Construction - SS 304 Air jets - Adjustable nozzles, placed on the left, right and top side panels Door - SS 304 doors with double walled flush glass view panels & door closer Door Opening - Straight entry – Straight exit & 90 degree door opening Differential Pressure Gauge - 0-25 mm to monitor pressure drop across HEPA ON/OFF Switches - ON/OFF Switches for motor & lights Control System - Interlocking System to ensure that both the doors cannot open at the same time & to ensure that both the doors will be locked during the time air flow is on Time Setting for Air shower - Time Setting for Air Shower operation time settable for 30 seconds to 5 minute Operation mode - Automatic as well as manual mode Vibration Level - Minimum							
	Power Supply - * Supply filter (HEPA) - Minipleat HEPA filter with hot melt technology, conforms to EU-14 Grade at supply position with efficiency better than 99.999% for 0.3 micron Supply filter (Pre-filter) - Pre-filter made from non-woven synthetic with HDPE mesh; conforms to EU 6 Grade at supply position with efficiency better than 95% down to 5 micron							

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
	NOTE: 1. The vendor to submit GA drawings for approval before fabrication. 2. Before dispatch of the Air shower factory inspection & Run test to be provided for client approval. 3. The airshower is designed for a one personnel entry at time							
	Rate in words:							
8	**SS APRON STORAGE CABINET & C O B**							
	Supply of 18 G S.S.304 construction apron/overcoat cabinet with mirror finish. The cabinet consists of 10 units (5x2), each with compartments for dresses, equipped with locks, handles, and louvers on the doors, all with a matt finish as shown in the drawing. The bottom legs will be provided with nylon bush.							
8.1	1000mm (W) X 400mm (D) X 2100mm (H)	1	Nos					
	Rate in words:							
8.2	1500mm (W) X 400mm (D) X 500mm (H)	1	Nos					
	Rate in words:							
9	**SS DISCARD BIN**							
	Supply and Installation of SS Waste Bin with foot operated lid.							
9.1	350mm (L) X 350mm (W) x 600mm (H)	1	Nos					

Sl. NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
	The scope of the vendor shall be and not limited to supply, installation, loading, unloading, shifting and storage of the clean room panels. Vendor shall provide all elevation drawings and TDS documents for every item mentioned in the BOQ for approval before taking it to manufacturing. Vendors to submit the makes, samples, catalogues & specifications for all items for approval. The vendor shall also supply 6 sets of hard and soft copies of as built drawings before handover. Co-ordination with all agencies for electrical, utility, HVAC and Equipments.							
	Note : View panel area shall be deducted from wall panel measurements and should be calculated as a separate quantity from wall panel. Similarly Door area shall be deducted from wall panel measurements and should be calculated as a separate quantity from wall panel.							
	Rate in words:							
	Total							
	Add GST @ 18%							
	Grand Total							

Total Amount in words:

Number of corrections:		**Signature of the Contractor:**
Number of overwritings:		
Number of additions:		

Name of the work: SITC of Air Handling Units (AHUs) with VRF/VRV System including all Allied HVAC works suitable for class 100000 clean room conditions for LASE Lab at RRI Campus, Bengaluru

PART - C **SCHEDULE OF QUANTITY FOR HVAC WORKS**

SL NO.	DESCRIPTION	QTY	UNIT	SUPPLY RATE	SUPPLY AMOUNT	INSTALLATION RATE	INSTALLATION AMOUNT	TOTAL AMOUNT
1	**RECIRCULATION TYPE AIR HANDLING UNIT (CLASSIFIED AHU)**							
	Design, Supply, Installation, Testing and Commissioning of air conditioning, double skin air handling units of GSS powder coated sheet metal, cabinet type, modular construction Unit frame work shall have internally coved aluminum extrusion finish with thermal break profile. The panels shall be of double-skinned construction with outer skin being of pre coated GI Sheet & inner skin being of plain GI Sheet. **They shall incorporate min 45 mm thick injected HFC - Filler POLY URETHANE FOAM (PUF) insulation material of 40 Kg/M3 density, sandwiched between the external and internal sheets. Insulation shall be spread equal across the panel to avoid any air pocket.** The unit panels skin thickness should be not less than 0.8 mm for outer skin and 0.8 mm for inner skin. All panels shall be sealed (anti fungicide sealant material) against the framework. The Panel shall be mounted flush with the frame members to create smooth surface inside and outside. Magnahelic gauge with GI Powder coated mounting box and other accessories shall be provided across all filters.							
	Complete Units shall be mounted on a continuous common base frame (150 mm). **AHU to comprise of various sections as described below sequentially in the direction of airflow.** **Each section to be properly sized to accommodate various components:** **The unit top shall be covered with a Rain protection canopy, the canopy shall be with necessary angle frame supporting arrangement covered with corrugated sheet, rubber beeding for sharp edges & water collection tray / pipe.**							

SL NO.	DESCRIPTION	QTY	UNIT	SUPPLY RATE	SUPPLY AMOUNT	INSTALLATION RATE	INSTALLATION AMOUNT	TOTAL AMOUNT
	Note: **1) Fans, Motors,Coils, Filters to be sized for a capacity of 110% of rated Airflow.** **2) All Dampers shall be Low Leakage extruded aluminum aerofoil type opposed blade type suitable for manual operation with Low Leakage type with locking & graduation arrangement.** **3) Face velocity across filters and coils shall not exceed 500 FPM.** **4) Fan Efficiency shall be not less than 70%.** **5) Fan motor shall be VFD driven along with bypass starter arrangement.** **6) Leak Proof Hinged service door with mesh guard for Fan section to be provided.** **7) Leak Proof Hinged service door for Filter section, Mixing section & Coil section to be provided.** **8) Double panel inspection window made from polycarbonate material. Each glazing to be of minimum 3 mm thickness for Fan section to be provided.**							
	Note : **• Vendor to submit Technical Data sheets for filters, fans with fan curves, dampers, Cooling coil, clearly mentioning the make and pressure drop (initial and final in case of filters) across them** **• Total Static pressure to be reconfirmed by HVAC vendor before ordering the AHU.** **• Do refer to the technical specification.** AHU shall be complete with Mixing Box with Fresh air low leakage aluminum volume control damper with GI Mesh & Return air connection with low leakage aluminium volume control damper. Filter section with G4 & F7 Combined type Filters & Fixing Frame.							

SL NO.	DESCRIPTION	QTY	UNIT	SUPPLY RATE	SUPPLY AMOUNT	INSTALLATION RATE	INSTALLATION AMOUNT	TOTAL AMOUNT
	VRF cooling coil section (Min. 6 rows) comprising of Copper tubes with aluminium fins and Copper header (The coil shall be Interlaced Design as per VRF ODU requirement). Coil inlet & outlet connections shall be suitable for connecting DX copper pipes & associated sensors. Coil face velocity shall be 450 Fpm. Necessary clamping points for Eva IN & Eva OUT shall be provided on the coil header.							
	20 Swg SS 304 drain tray with 13 mm thick insulation. Floating ball type drain trap shall be provided. SS temperature Probes before and after the Cooling coil section to be provided on the AHU casing. (Coil face area shall have anti corrosion paint). Fan Section complete with Backward curved Plug fans (NLT 70% efficiency) mounted on pedestal & common base frame, Direct driven by IE-3 motor suitable for Industrial type VFD operation (VFD in Electrical Tender scope). 2 Nos Blower with Motor & other accessories (1 Working + Standby) Blower protection perforated GI screen. Anti Vibration Spring type isolators for mounting Blower shall be considered. Refer Air Flow Diagram Cable entry gland shall be provided on the AHU casing. The Fan Section to be provided with Marine type light fixtures and Limit switch which shall be internally wired (running in conduit and neatly dressed) terminating in a switch (ON / OFF) & Junction box on the AHU casing. (Electrical Contractor shall terminate the power supply to this point),							

SL NO.	DESCRIPTION	QTY	UNIT	SUPPLY RATE	SUPPLY AMOUNT	INSTALLATION RATE	INSTALLATION AMOUNT	TOTAL AMOUNT
	Fire proof double canvas connections (Fungal Resistant and Lint free) to be used to connect the fan to the AHU Casing. Bleed-off Damper with module for supply & fixing H13 HEPA Filter along with MS powder coated grille shall be provided. Empty Section with Low leakage Aluminium volume control outlet damper for Supply.							
1.1	**AHU - 1Working/1Standby** **Blower Capacity :- 9600 CFM** **Dehumidified Air Volume :- 9600CFM** **Post Cooling Capacity :- 24 TR** **Static :- 165 mm wg**	2	No					
	Rate in words:							
2	**HVAC DUCTING**							
	Supply, Installation and Testing of CNC machine fabricated G.S.S. Ducting as per specification complete with supports, with GI rivets, nut-bolts, with hot dip galvanized TDF Flanges with 'G' Clamp, 6 mm thick food grade neoprene gaskets duly installed between flanges. Leak Testing of ducts at site shall be carried out as per SMACNA standards. Food grade silicon sealant shall be applied in the longitudinal length of a ducts & for all angle flanges. The duct shall be Longitudinal sealed with silicon sealant from factory & Duct Flange Sealing with Silicon Sealant shall be considered. Duct Construction to be As per SMACNA 3" W.G (75 mm) with 20x6 mm thick gasket. All necessary accessories like Flanges, Gaskets, Bolt, Nut, Washers, Duct indicating Sticker, Duct supports, anchor Bolts etc. shall be considered. Note: 1. The ducting shall be boxed and wrapped in plastic cover before dispatch from factory.							

SL NO.	DESCRIPTION	QTY	UNIT	SUPPLY RATE	SUPPLY AMOUNT	INSTALLATION RATE	INSTALLATION AMOUNT	TOTAL AMOUNT
	2. Neccessary access doors for duct cleaning / fire damper and Guide vanes shall be provided as per SMACNA standards. 3. The 'G' Clamps to be tightened using electric torque wrench to provide uniform tightening.							
2.1	24 G	220	Sqmtr					
	Rate in words:							
2.2	22 G	150	Sqmtr					
	Rate in words:							
2.3	20 G	100	Sqmtr					
	Rate in words:							
3	**DUCT INSULATION**							
3.1	**THERMAL INSULATION (INSIDE BUILDING)**							
	Supply and fixing of Elastometric Self adhesive Nitrile Rubber Insulation of Class 'O' with factory applied reinforced aluminum foil with aluminum tape in all corners of the same make that of insulation. Duct surface need to be cleaned before fixing of insulation. Note: Insulation shall be installed in four piece manner instead of wrapping around.							
3.1.1	19 mm thick for Supply Air ducts	300	Sqmtr					
	Rate in words:							
3.1.2	13 mm thick for Return Air ducts	300	Sqmtr					
	Rate in words:							

SL NO.	DESCRIPTION	QTY	UNIT	SUPPLY RATE	SUPPLY AMOUNT	INSTALLATION RATE	INSTALLATION AMOUNT	TOTAL AMOUNT
3.1.3	Supply and Installation of Aluminum Cladding for External Ducts	300	Sqmtr					
	Rate in words:							
3.2	Supply & Installation of Flexible canvas connections for Air Handling Unit	2	Nos					
	Rate in words:							
4	**TERMINAL HEPA FILTER WITH MODULE**							
	Supply, Installation, Testing and Commissioning of Terminal H14 HEPA Filter with Housing & Damper (Bottom Discharge Module Type with SS304 perforated grille of 16 SWG sheet). Complete Housing (Sides + Top) made of extruded aluminium anodized material and low leakage aluminum collar damper with operating bevel gear arrangement, Diffuser Plate, Housing shall be suitable for fixing the Gel Seal type (Polyurethane gel) terminal HEPA filter (H-14 as per EN1882 Class) with Protective CG Screen. The Filter Housing shall have provision for smoke aerosol test point and differential pressure measuring point. The filter mounting box shall have a provision to replace filter & control the airflow from inside conditioned space. The HEPA filter modules are of the following sizes:							
4.1	**H1 : Filter Size 605 x 605**	10	Nos					
	Rate in words:							
4.2	**H2 : Filter Size 450 x 450**	1	Nos					
	Rate in words:							
5	**INSULATED FLEXIBLE DUCT**							

SL NO.	DESCRIPTION	QTY	UNIT	SUPPLY RATE	SUPPLY AMOUNT	INSTALLATION RATE	INSTALLATION AMOUNT	TOTAL AMOUNT
	Supply & Installation of insulated flexible duct of maximum 1 Mtr length made with core constructed from 12-15 micron aluminum film (Outer) bonded to 25 mm thick polyester blanket encapsulating helically wound spring steel wire bounded with 12-15 micron aluminum film (Inner side) with adhesive (insulation shall be jacketed) and fastened with set of round clamps 8mm wide cable tie on both the ends of ducts & tightly sealed with self adhesive aluminum tape. Note: 1. Dia of Flexible duct shall be as per approved disc valve. 2. Flexible duct shall be suitably fire rated.							
5.1	275 mm dia	2	Rmt					
	Rate in words:							
5.2	350 mm dia	20	Rmt					
	Rate in words:							
6	**ELECTRICAL DUCT HEATER**							
	Electircal Heating section with Flange-in-type Finned tubular air heating elements of Incoloy-800, Stainlesssteel 321 sheathed tubular elements of U/M shape which are mounted on a detachable terminal plate using galvanised retainers. The Terminals are supported by Ceramic bushings staked in to supporting brackets. A mounting flange permits attachment to the Air Handling Unit. **The heaters should be equally distributed in three phases of Heater capacity should cater for all seasonal variations and changes in equipment / product load from 0% - 100% and shall be suitable for thyristor control.**							

SL NO.	DESCRIPTION	QTY	UNIT	SUPPLY RATE	SUPPLY AMOUNT	INSTALLATION RATE	INSTALLATION AMOUNT	TOTAL AMOUNT
	The heaters shall be connected in equal capacity across each phase. **The Heater shall be fired by a Thyristor based on the Input from the Temperature sensor in Return air duct.**							
	Thyristor panels and suitable for BMS compatible system shall be housed in a suitable Indoor type and Powder coated encloser made out of 14 SWG (2mm) for enclosure 16 (1.6mm) SWG for door & 3mm thick for gland plate MS CRCA sheet which is derusted, degreased, phosphated and passivated with angle iron skeleton or sheet folded construction. The panel to be dust and vermin proof type with powder coated paint after suitable seven tank pre-treatment. MS angle support to be provided for panel mounting. Cable entry shall be bottom.							
	The Electric panel shall include the Incomer terminal bus bar, Step Controller, Rh sensor, Power fusing, MCCB with Thermal magnetic releases, Magnetic contactor along with pilot lights/switch /relay and safeties like Thermal safety devices (thermal cutout and thermal fuses), Air differential pressure switches, temp auto thermostat and complete with factory internal wiring & cabling from Rh sensor to controller with heat resisiting copper conductor and cabling, insulated walls, cable entry gland, earthing, and interconnections all housed in G.I Enclosure. Thyristor with heat sink, suitable kW spreader link, RHOM, Power Contactors, Control transformer, Potential free contactors, Temperature controller, Teperature Sensor, Thermostat, Air pressure differential switch, Secondary thermal cutout, k-10 potential meter, ON/OFF push button, RYB & ON/OFF Indication Lamp, Thermistor , Control input signal of 4-20mA/0-20mA, contactor for Interlock between AHU & Heater panel all control wiring Suitable for heater rating, MCB, Power socket, LED lamp with limit switch arrangement and following below items etc.,							

SL NO.	DESCRIPTION	QTY	UNIT	SUPPLY RATE	SUPPLY AMOUNT	INSTALLATION RATE	INSTALLATION AMOUNT	TOTAL AMOUNT
	ON - Delay Timer - T25 - 1 No, Emergency Switch- 1 No, Exhaust Fan - 2 Nos, Copper Bus Bar- 1 Lot, Terminals - Standard- 1 Lot, Power & control wiring- 1 Lot, 10A 24VDC Power Supply- 1 No							
	Following heater panel shall be housed in a suitable outdoor type Powder coated encloser made out of 14/16 Swg MS CRCA sheet which is derusted, degreased,water proof, phosphated and passivated with angle iron skeleton or sheet folded construction. The panel to be dust,water proof and vermin proof type(IP-55) and with powder coated paint. cable entry shall be bottom. Control Panel for heater shall include Thyristor, Contacts, control transformer, RYB & On/Off Indication Lamp, Control input signal of 4-20mA/0-20mA, all control wiring Suitable for heater rating.							
6.1	**UNIT NUMER : AHU-1** **HEATING CAPACITY : 40 KW**	1	No					
	Rate in words:							
7	**MAGNEHELIC GAUGE**							
	Supply & Installation of Magnehelic gauge with suitable with face plates of thickness 2 mm & 16 gauge GI Box & PU Tube/ silicon tubing suitable for AHU mounting with nozzle & complete accessories for clean rooms. Gauges shall be of following ranges Note: Magnehelic guage shall be of "Dwyer" make and "Series 2000 Magnehelic® Gauge" model.							
7.1	Temp, Humidity & Room Pressure (For Room) (Room side Digital display Considered	3	Nos					
	Rate in words:							

SL NO.	DESCRIPTION	QTY	UNIT	SUPPLY RATE	SUPPLY AMOUNT	INSTALLATION RATE	INSTALLATION AMOUNT	TOTAL AMOUNT
7.2	0 to 1000 Pa (For AHU)	2	Nos					
	Rate in words:							
7.3	Supply and Installation of Digital Signages for Labs (Input required from the Client)	5	Nos					
	Rate in words:							
8	**VOLUME CONTROL DAMPER**							
8.1	Supply & Installation of 16 G GI low leakage opposed blade type damper. The damper shall be of aerofoil type and made from extruded Aluminium. Damper shall be provided with calibrated scale and with a locking mechanism.	2	Sqmtr					
	Rate in words:							
9	**FIRE DAMPER**							
9.1	Supply/ Installation/ Testing/ Commissioning Fire damper with fusible links (Damper should have a limit switch to show the open/close position) as per specifications. (Each Fire damper shall be provided with one limit switch and shall have two NC contactors).	2	No					
	Rate in words:							
10	**CONDENSATE DRAIN PIPING**							
	Supply, laying, joining, testing and commissioning of CPVC 4120 SDR 11/SCH40 plastic pipe as per ASTM D-2846/ASTM F 441 pipeline with necessary slope.The rate quoted shall include for (All fittings shall be heavy duty type SCH80 as per							

SL NO.	DESCRIPTION	QTY	UNIT	SUPPLY RATE	SUPPLY AMOUNT	INSTALLATION RATE	INSTALLATION AMOUNT	TOTAL AMOUNT
	ASTM F439) necessary U-Trap, Unions, Reducer, Coupling, Tee, Reducer tee, Elbow, Male adapater, Female adapter, End cap, Brass couplings, Flange, Gaskets, clamps,Tagging (Acrylic), Adhesives solution(ASTM F-493), Wall bores cutting through walls, 100 density PUF, MS supports for drain pipes (Clamps, ISMC, ISA), etc. as per dwg to be considered for all sizes of every 1.5 mts distance. Note: Mode of Pipe measurement will be centerline measurement without any additional measurement for U-Trap, bends,Tee, reducers and fittings, supports etc.							
10.1	50 mm OD	20	RMts.					
	Rate in words:							
11	**M S STRUCTURAL WORK**							
11.1	Supply & Installation of M.S. Structural work, Quoted price shall include transportation, unloading, safe storage, shifting, reshifting, lifting, installation & commissioning of M.S. Structure items at the directed place.	1500	Kgs					
	Rate in words:							
11.2	Supply of Clean room Cosumables like ESD Gowning Set ,Esd Shoe Cover &Cap	20	Set					
	Rate in words:							
12	**VALIDATION, PERFORMANCE TESTING, BALANCING OF THE HVAC SYSTEM**							
12.1	Vendor to conduct the following tests and validate the HVAC system. This process to be documented. 1. Duct Leakage Testing with Pressurization (As per SMACNA Air Duct Leakage Standards). 2. HVAC Testing, Adjusting and Balancing.	1	Job					

SL NO.	DESCRIPTION	QTY	UNIT	SUPPLY RATE	SUPPLY AMOUNT	INSTALLATION RATE	INSTALLATION AMOUNT	TOTAL AMOUNT
	3. Checking and Recording all the parameters in TAB format for the equipment's like: Air Handling Units. This includes Electrical measures (Frequency, Power factor & Kw.), Hydronic flow measures, Pressures drop across heat exchangers (Water & Air), Airflow measures, Motor RPM measures & Thermal measure. 4. Cleanroom Performance Testing, Adjusting, Balancing and Recording, 3. Clean room validation to be done at rest conditions. a. AHU Testing including AHU filters (Contractors Scope). b. Air balancing with Flow Hood. c. Room Temperature Test & RH by 48 hours d. Room Pressure Balancing							
	Rate in words:							
12.2	Qualification of the systems including DQ, IQ, OQ along with documentation and reports as per Client requirement.	1	Job					
	Rate in words:							
12.3	Perfomance qualification support for the project.	1	Job					
	Rate in words:							
	Total							
	Add GST @18%							
	Grand Total							

Amount in words:

Number of corrections:					Signature of tenderer:
Number of overwritings:					
Number of additions:					

Name of the works: Supply, Installation, Testing and Commissioning (SITC) of Air Handling Units (AHUs) with VRF/VRV System including all Allied HVAC works suitable for class 100000 clean room conditions for LASE Lab at RRI Campus, Bengaluru

PART - D

SCHEDULE OF QUANTITIES

SL NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
1	**CONSTRUCTION OF ANTI STATIC CHEMICAL RESISTANT EPOXY FLOORING ON VDF**							
1.1	Providing, supplying, and applying of Anti-Static Chemical Resistant Epoxy Flooring -Application and supply of 3mm thick epoxy-based cementized self-leveling motorized screed works - Application of 2mm solvent-free, self-leveling epoxy flooring - Application of 2mm thick deceptive or conductive Grade ESD Flooring system with a fiber-free system. The technical parameters should be as follows: - Surface Resistivity of 10^4 to 1x10^6 ohms in Statguard FF 104 - Surface Resistivity of 10^6 to 1x10^9 ohms as per ASTM F 150 - Minimum 10-12% elongation as per ASTM D 638 - Abrasion resistance of 65-80 mg loss with 1000 cycles of CS 17 wheel - Impact resistance of 1.8kg-100cm as per IS 101 - Scratch resistance of minimum 4 kg pass as per IS 101	75	Sqm					

SL NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
	- Recommended Dry Film Thickness of ESD should be 1000 microns as per ASTM D 7091 - Application of a solvent-free 100-micron, water-based two-component conductive coating, VOC-free, non-toxic ESD undercoat - Application of primer over properly placed 25mm wide copper tapes, placed in a grid pattern over the screed at a thickness of 1mm. The technical parameters are as follows: - Compressive strength: ≥ 35 Mpa as per ASTM D 695 - Tensile strength: ≥ 9 Mpa as per ASTM D 638 - Elongation: ≥ 1.8% as per ASTM D 638 - Flexural strength: ≥ 15Mpa as per ASTM D 790 - Pull-off Adhesion: ≥ 2 Mpa as per ASTM D 4541 - Application over an epoxy-based primer with pull-off adhesion of ≥ 2 Mpa, as recommended by the manufacturer - All substrates should be well-ground and free from all contaminations and cracks. The surface must be clean, dry, and sound concrete, prepared using scarification & grinding. The residual moisture should be less than 5%.							

SL NO.	DESCRIPTION	QTY	UNIT	SUPPLY		INSTALLATION		TOTAL
				RATE	AMOUNT	RATE	AMOUNT	AMOUNT
	VACCUM DEWATERED FLOORING CONCRETING ,DEWATERING AND POWER TROWEL FINSIHING - Providing and laying in position reinforced cement concrete of mix M-25 grade for flooring the concrete to contain no GGBS or fly ash Dewatering the concrete with vacuum dewatering machine, finishing the concrete with Power Trowel to get required finish and vibrating with mechanical screed vibrators, watering curing etc. including cost and conveyance of cement metal and all other materials including the cost of labour for all items of work, cost of machinery and equipment and all other incidental charges for successful completion of the work with all lead and lift, loading and unloading etc. complete as per specification and a per instruction of PMC/Consultants/Architect. (excluding the cost of steel and fabrication charges, groove cutting and groove sealant fillers).							
	Approved make: Dr.SIKA							
	Rate in words:							
1.2	**CONSTRUCTION OF EPOXY COVING**							
1.2.1	Epoxy coving shall be for junctions of Wall/Wall. Same shall be constructed with solventless epoxy resin incorporating very high abrasion resistant aggregates & shall be finish with epoxy paint. They could be constructed in Horizontal, Vertical and Ceiling locations. Coving Shall be merged with wall leveling on one end and floor on the other. Size of the coving shall be 75mm	60	Rmt					
	Approved make: Dr. SIKA							
	Rate in words:							
Total Amount in words:								

Number of corrections:		**Signature of the Contractor:**
Number of overwritings:		
Number of additions:		

Name of Work: Supply, Installation, Testing and Commissioning (SITC) of Air Handling Units (AHUs) with VRF/VRV System including all Allied HVAC works suitable for class 100000 clean room conditions for LASE Lab at RRI Campus, Bengaluru

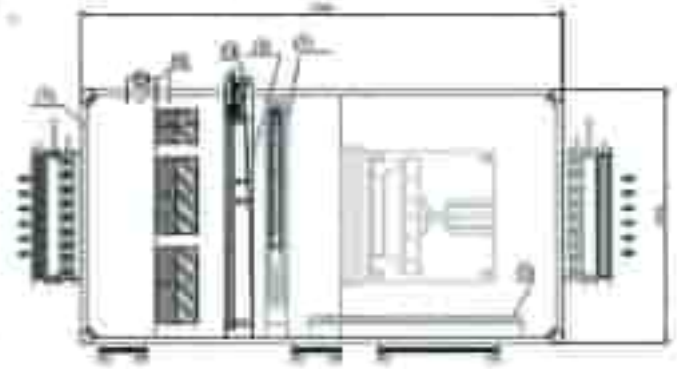
Sl. No.	Description	Quoted Amount	Remarks
1	PART – A :		
2	PART – B :		
3	PART – C :		
4	PART-D :		
	Total		
	Add GST @ 18%		
	Grand Total		
Total Amount in Words:			
Number of corrections:			
Number of overwriting's:			
Number of additions:			**Signature of tenderer:**

LIST OF APPROVED MAKES

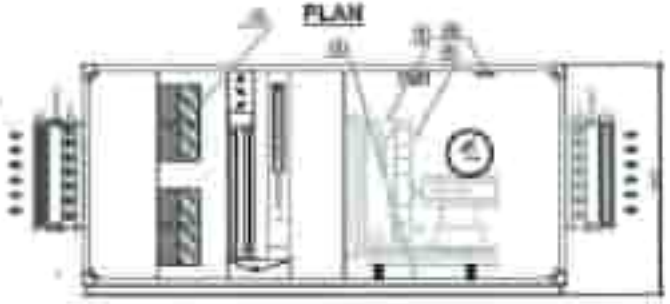
MAKE LIST		
SL.NO	**DESCRIPTION**	**MAKE**
1	AHU'S	M/S.VTS / ZECO/ECO AIR
2	GI SHEETS	M/S.JINDAL
3	DUCT FABRICATION	M/S. DEV DUCT
4	DUCT INSULATION	M/S.ARMACELL / K-FLEX / SUPREME
5	PRE-& FINE FILTERS	M/S.AAF / MECK MARK
6	HEPA (0.3) FILTERS	M/S.AAF / MECK MARK
7	PLUG FAN	M/S KRUGER /NICOTRA
8	MOTOR	M/S.ABB / CG
9	VOLUME CONTROL DAMPERS	SYNCHO / AIR MASTER
10	FIRE DAMPERS	SYNCHO / AIR MASTER
11	MAGNEHLIC GAUGES FOR PRESSURE	M/S.DWYER
12	TERMINAL HEPA MODULES	M/S. AAF / MECK MARK
13	VRF SYSTEM	M/S. SAMSUNG / CARRIER
14	DUCT HEATERS	M/S DASS PASS / HEATCON
15	CABLES	M/S POLYCAB FRLS
16	VFD'S	M/S DANFOSS / ABB
17	WALL, CEILING PANEL	M/S DEN AIR / MOUNT ROOF

NOTE: Other than the above specified, vendor has to take prior approval from client

TECHNICAL SPECIFICATION OF AHU - 01, 9600 CFM

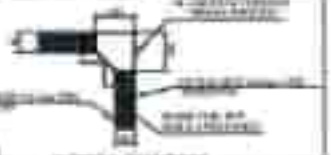


PLAN

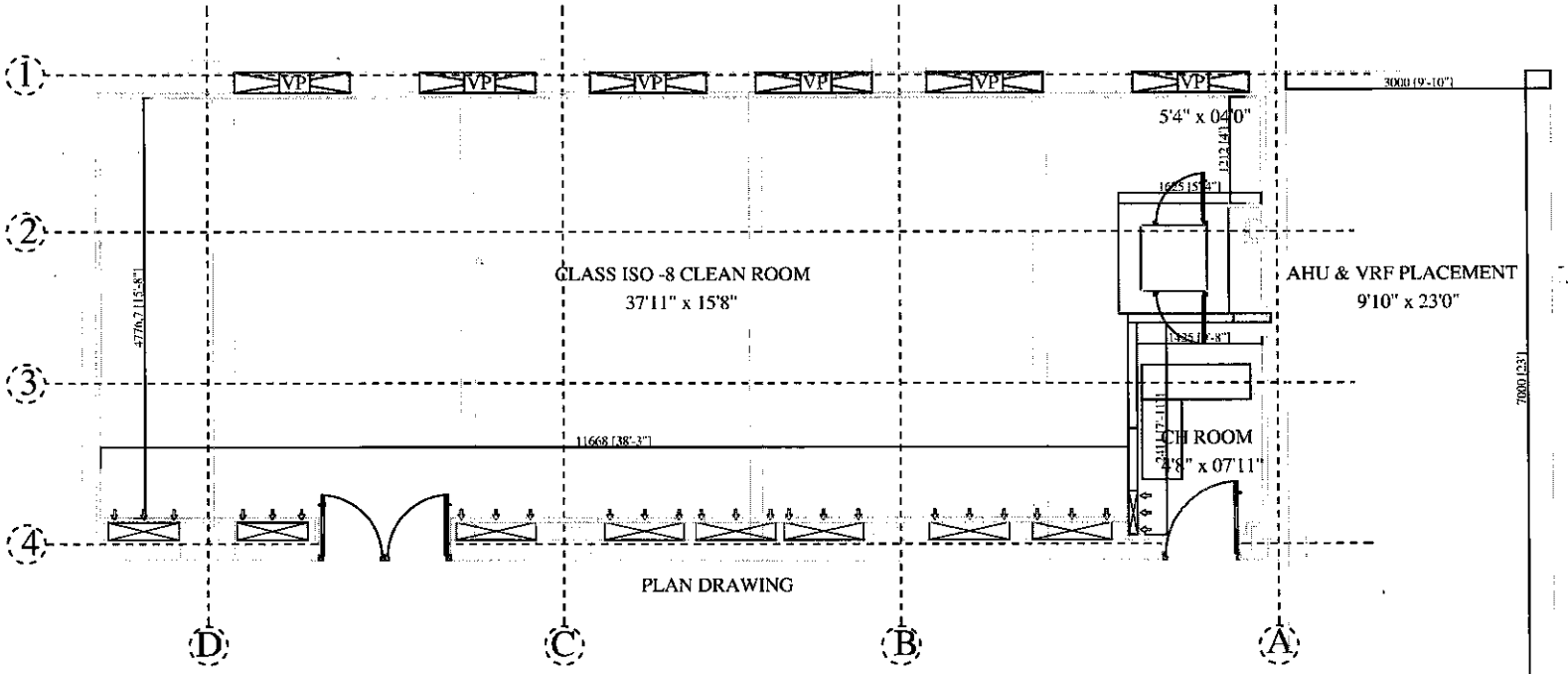


ELEVATION









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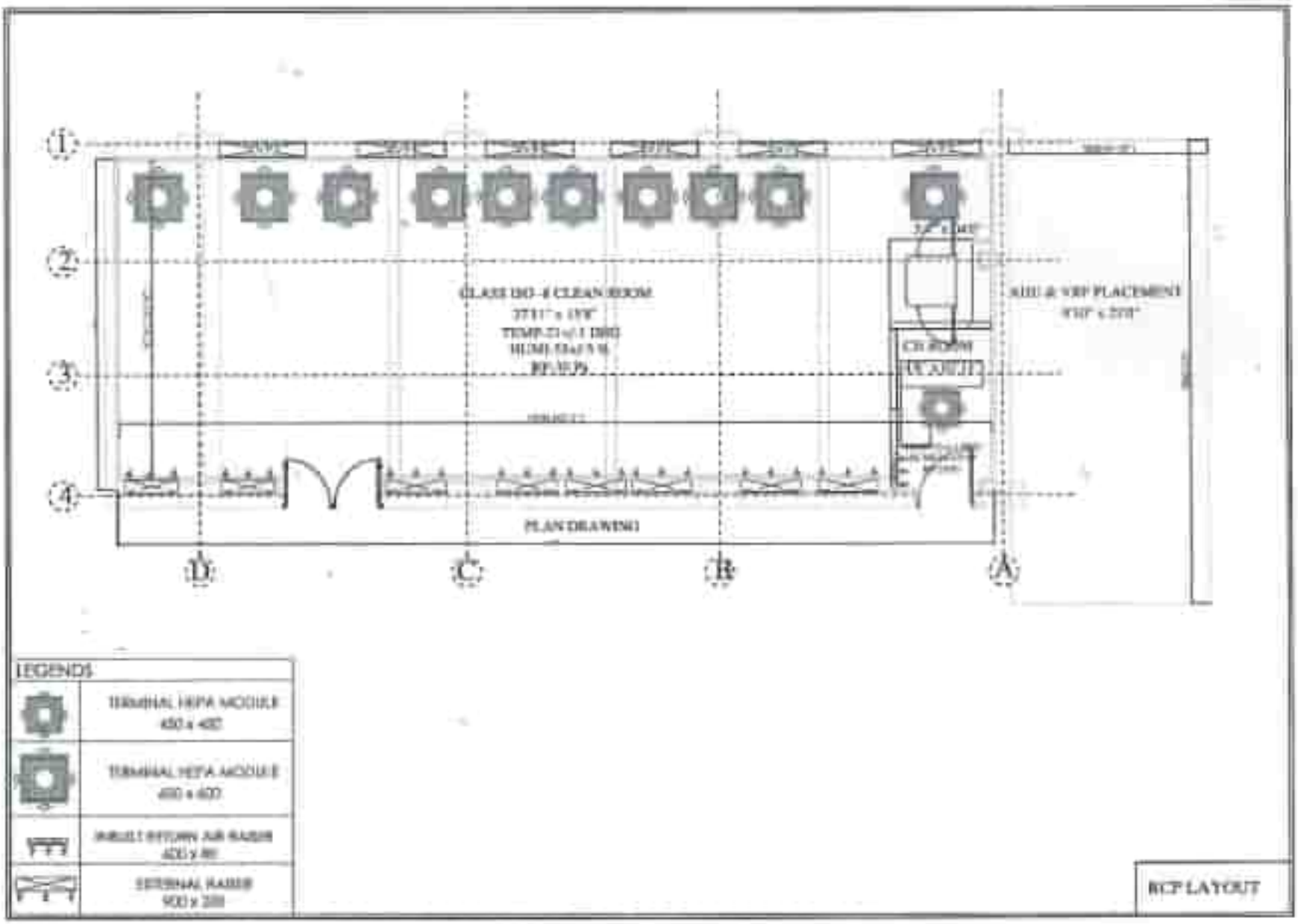
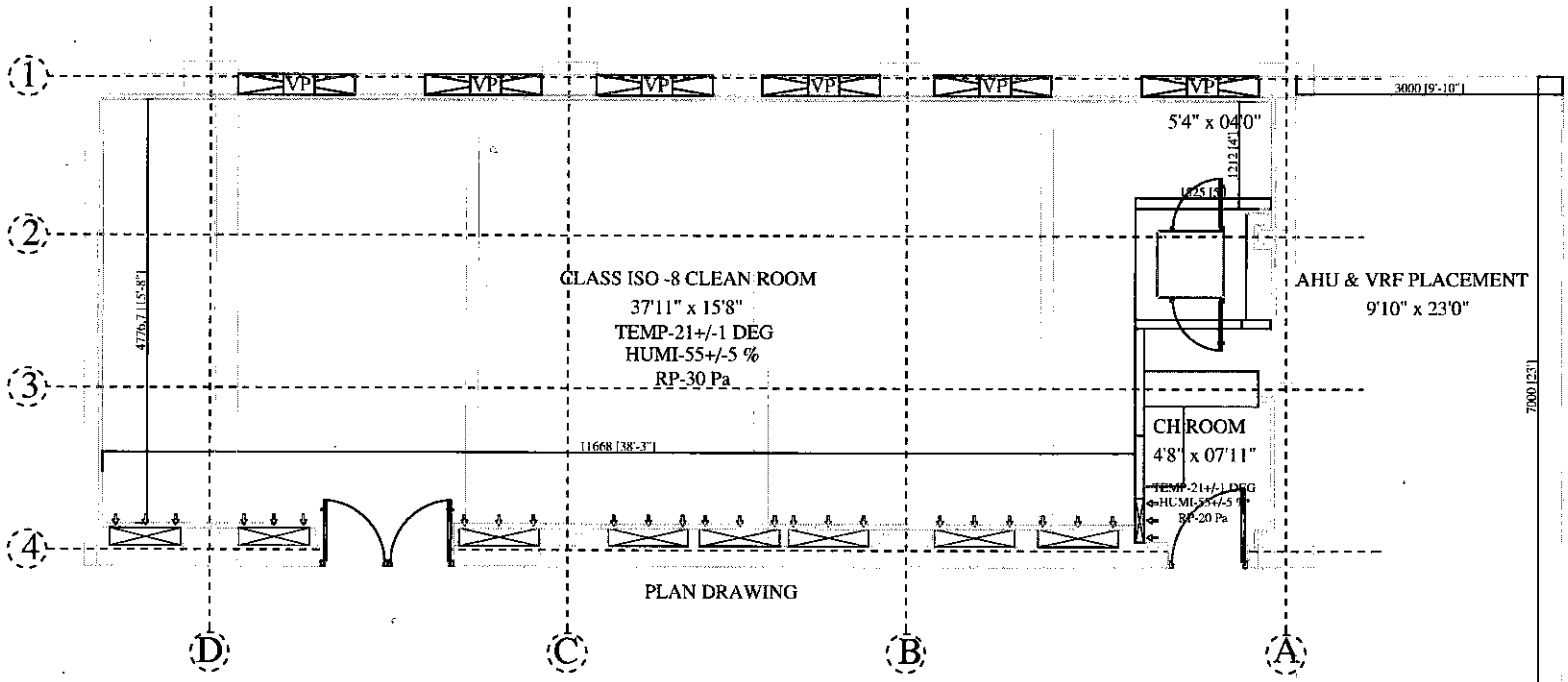
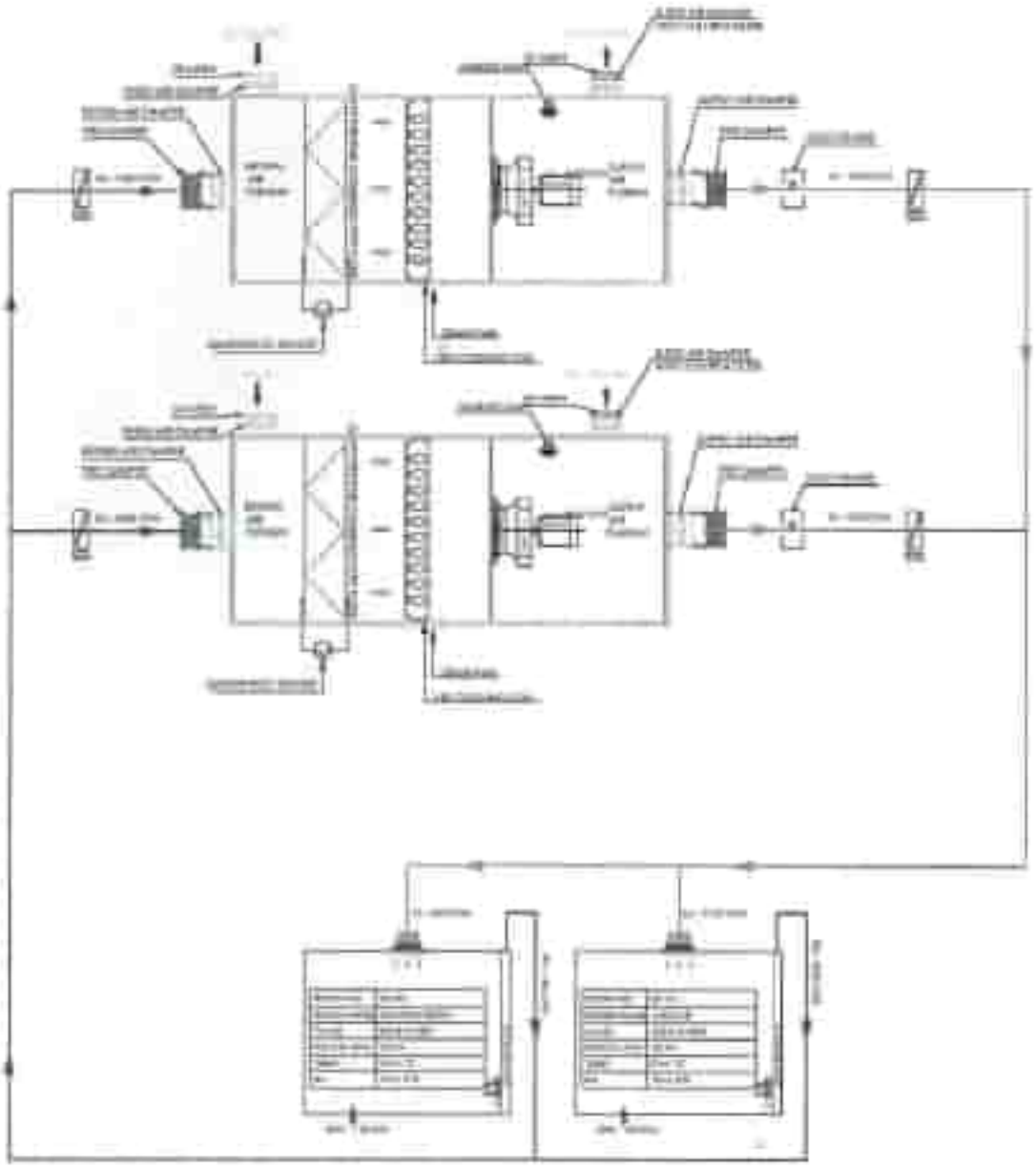

1
2
3
4
D
C
B
A
PLAN DRAWING
LEGENDS
RCP LAYOUT

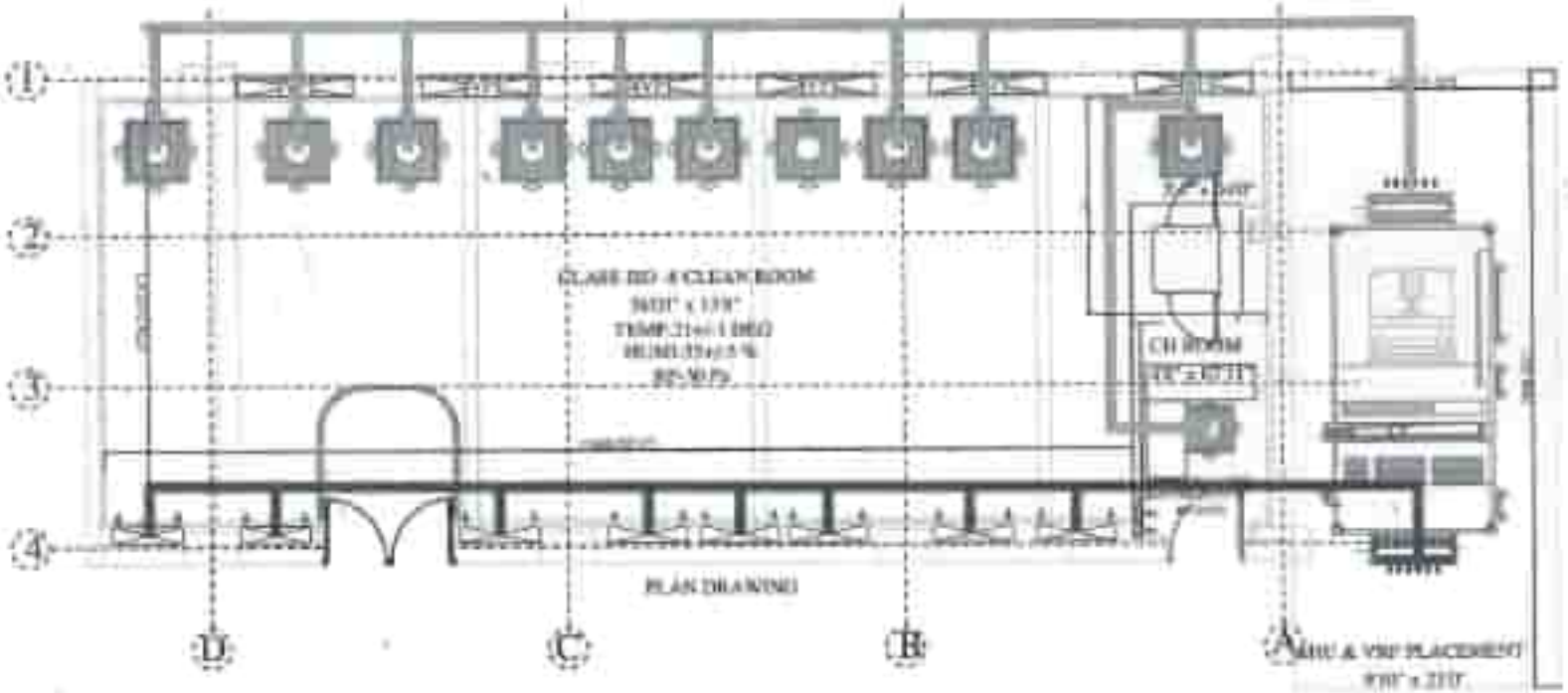


PLAN DRAWING

PRESSURE GRADIENT DRAWING

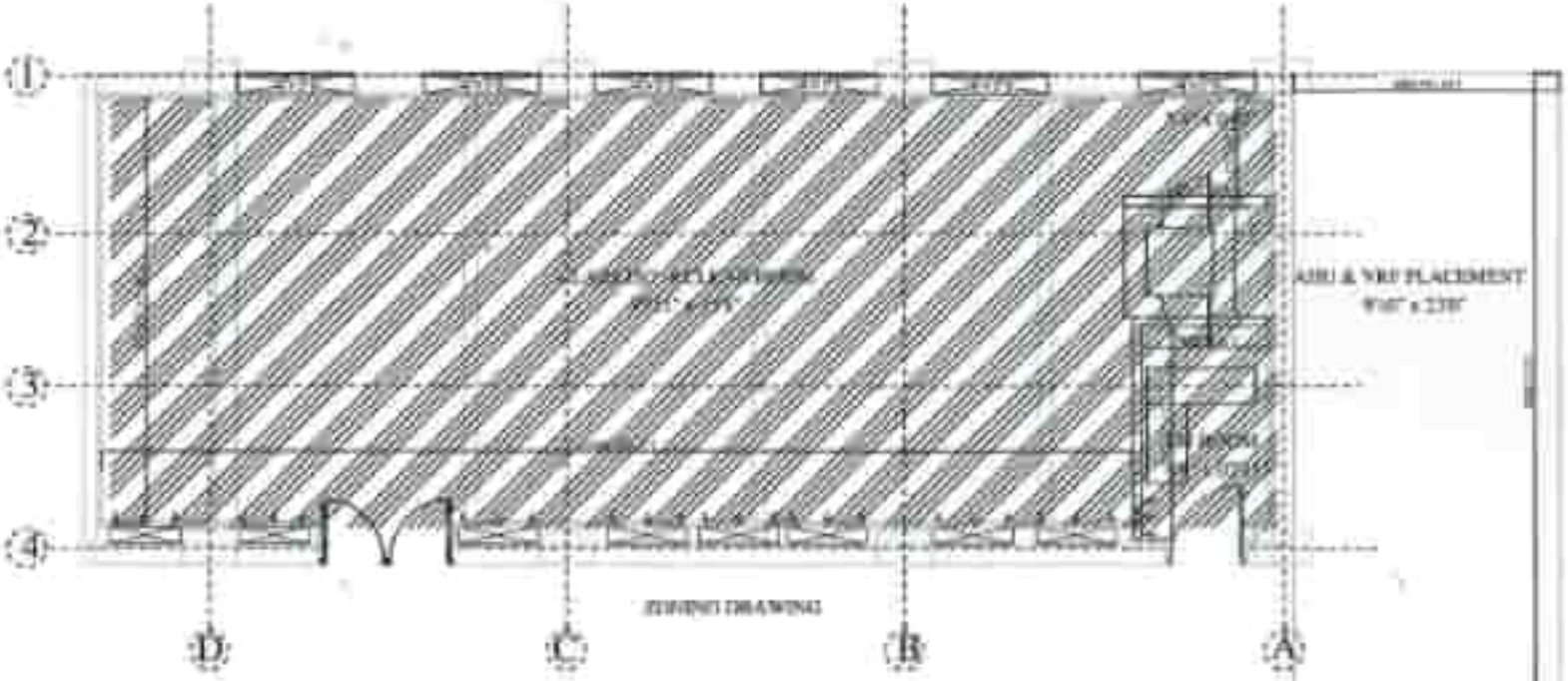


AIR FLOW DIAGRAM FOR AHU-1
1 WORKING 1 STAND BY



LEGENDS	
	TERMINAL HEPA MODULE 600 x 600
	TERMINAL HEPA MODULE 600 x 600
	RIBBED RETURN AIR BASER 600 x 80
	EXTERNAL BASER 600 x 200

SLD LAYOUT



LEGEND:

AIR HANDLING UNIT

TAG NO :- AHU-1
CLASS :- ISO 8 @ REST
TEMPERATURE :- 27.4 ± 1 °C
RH :- 50±1-5%

ZONING DRAWING