

TENDER DOCUMENT
FOR AIR CONDITIONING AND VENTILATION
OF
KERALA LAW ACADEMY GUEST HOUSE
AT KLA-CALSAR- HEATHER TOWER, PUNNEN ROAD,
TRIVANDRUM
KERALA, INDIA

INVITATION TO TENDER / TENDER NOTICE

Sealed tenders are hereby invited for the following Air Conditioning work as per the details given below.

1. The tender documents can be had from the office of Kerala Law Academy, Peroorkada, Thiruvananthapuram or can be downloaded from www.keralalawacademy.in

2. The tender shall be duly filled-in as per the 'Instructions to the Tenderers' attached herewith and shall be received at the 'Place of submission of Tenders'

3. Tender Details

Description of Work	Air Conditioning & Ventilation of KERALA LAW ACADEMY GUEST HOUSE in KLA – CALSAR – HEATHER TOWERS, PUNNEN ROAD, NORTH OF GOVERNMENT SECRETARIAT, THIRUVANANTHAPURAM.
Date of issue of Tender	27.04.2016 Onwards
Place of submission of Tender	Kerala Law Academy Office, Peroorkada
Last date and time for receipt of Tender	06.05.2016, 4.00 p.m.
Date of Tender Opening	07.05.2016, 3.30 p.m.
Earnest Money Deposit	Nil
Completion period	4 months
Cost of Tender Documents	Rs. 500/- (if downloaded from website, no fee)

Thanking you,

For KERALA LAW ACADEMY

AIR CONDITIONING AND VENTILATION

OF

KERALA LAW ACADEMY GUEST HOUSE AT

AT KLA-CALSAR- HEATHER TOWER, PUNNEN ROAD,

TRIVANDRUM

KERALA, INDIA

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INSTRUCTIONS TO TENDERERS

1. Tenderer shall read all the pages of the Tender documents in detail and their authorized signatory should sign with their official seal on all the pages forming the tender documents.
2. The tender documents comprise of the documents mentioned in the previous page. These documents along with Articles of Agreement and other documents as maybe mutually agreed upon shall form part of the Contract agreement to be entered into between the Contractor and the Owner and the other parties involved in the Work, if necessary.
3. The completed tender documents duly filled in shall be submitted along with all the associated documents during the time of submission of the Tender.
4. No page of the tender documents shall be removed or modified other than for indicating rates.
5. Any comments that the tenderer desires to make shall not be written on the Tender documents. This may take the form of a separate document which is as brief and clear as possible giving reference to the statement or and clauses and pages of the Tender documents.
6. Tenderer should be willing to commence the work within the specified time.
7. Tenderer should be willing to complete the total work within the specified time limit indicated.
8. The Owner is deemed the accepting authority of the Tender for the purpose of awarding the Contract.
9. The right for acceptance of the tender shall remain with the Owner who do not bind himself to award the work to the lowest or any tender. No details or reasons shall be furnished to any person or organization or statutory body for the rejection or acceptance of any Tender. The owner is entitled to assess the quality and technical valuation of the tender bids as well as realistic value and practical aspects of the tender bids/amount tendered, through the Technical Team/HBAC Consulting Engineer/Technical Person authorized by the owner and take appropriate decision in awarding the work.
10. The right of acceptance of the Tender in part or whole or the right to employ different contractors for separate works rests solely with the Owner.
11. The Tenderers shall inspect the site and all the tenderers shall sign the same with their official seal and return along with the tender documents.
12. Tender documents shall be placed in a sealed envelope super scribed with the Description of the work, last date and time for receiving the tenders Name and address of the Tenderer and Name and address of the place of submission of the Tenders. Earnest Money deposit if called for should be enclosed in a separate sealed cover in the form of a Demand draft favoring the Owner and super scribed Earnest Money Deposit.

13. If the tenderer fails to commence the work within the specified time or refuses to accept the contract the earnest money deposit by the Tenderer will be forfeited.

14. If it is proved that two or more persons connected with one another either financially or as a principal or agent for one another have tendered under different names for the same contract without disclosing their relationship, then such tenders will be rejected and their Earnest Money Deposit will be forfeited.

15. Owner will not be responsible for or to pay any losses or expenses incurred by the Tenderer for the preparation and submission of the Tender.

16. Tenderers will be permitted access to the site of the work for inspection during tender period which may be arranged by request or application to the employer. It will be deemed that the tenderer has acquainted himself with the site conditions.

17. If the Tenderer finds any discrepancy, omission, ambiguity or conflict in or among the documents forwarded or is in doubt as to the interpretation and meaning, it should be immediately brought to the attention of the Consulting Engineers

18. Tenderers should submit the detailed computations showing the figures on which the units and overall rates are based if so requested by the Consulting Engineers.

19. Tenderers should write the total value of the Contract both in numerical figures and words. If any difference is found between the two, the value in words will be considered final.

20. Tenderers should quote for all the items indicated in the schedule of quantities of the tender documents. Incomplete tenders are liable to be rejected.

21. The successful tenderer (Contractor) will have to enter into a written Contract agreement (as per the attached Articles of Agreement) with the Owner on the terms and conditions of the Contract which form part of the tender documents. The contract will be considered valid only after the above agreement is signed by both the parties.

22. The Tender documents should be accompanied by the following documents if called for. Absence of any of the so required necessary documents in the following will render the Tender to be rejected.

a) Valid Income tax Clearance and Sales tax clearance certificates

b) Evidence showing experience of identical or similar work or projects with a list stating the Description, Location of the Sites with Telephone numbers, Name of the Clients, Nature of Contract, Date of completion, Date of award of Contract, Value of the work.

TENDER FORM

To
KERALA LAW ACADEMY
TRIVANDRUM

Sirs,

1. I/We have examined the tender documents comprising of tender notice, instructions to tenderers, Tender form, Articles of agreement, Special conditions of contract, All technical specifications, Precautions to be taken to ensure safety, All drawings and schedule of quantities. I/We the undersigned hereby offer to execute the works specified in the aforesaid tender documents and complete the same within the time limit specified therein, in conformity with the tender documents and with all the items indicated.

2. If this tender is accepted, I/We agree to comply with the following:

a) I/We shall abide by and fulfill all the terms, conditions and provisions contained in the aforesaid tender documents which have been read by me/us and explained to me/us. In default of the same I/We agree to forfeit and pay to the Owner or their successors the sum of money mentioned in the Tender documents.

b) I/We shall execute the complete work referred to in the said documents as per the terms and conditions of the Tender documents at the rates contained in the same or at any other rates as agreed upon as per the provisions and conditions contained herein. I/We agree to carry out any other work or items of works as may be ordered on me/us by the Owner which are not in the tender documents whereas the rates of which are contained in the same. I/We also agree to carry out the said extra work at any other rates as may be fixed under the provisions and conditions of the Contract.

c) The full value of the earnest money which has been deposited by me/us will be absolutely forfeited to the Owner or their successors, should I/we fail to commence the work specified or should I/we did not deposit the full amount of security deposit specified in the aforesaid documents in accordance with the Conditions of the Contract. The said amount shall be otherwise retained by the Owner as security deposit as provided for in the aforesaid documents.

3. I/We undertake that if our tender is accepted, to commence the works within 10 days of receipt of the Owner's / Consultants order to commence work, to complete and deliver the whole of the works comprised in the contract within the time limits specified in the tender notice calculated from the date of issue of work order to commence the work / letter of intent with 10 days mobilization period or from the date of handing over of the site whichever is later.

4. I/We agree to abide by this tender for a period of 30(thirty) days from the last date fixed for receiving the same and it shall remain binding on us before the expiry of this period.

5. I/We agree that until a formal agreement is prepared and executed, this tender, together with your written acceptance thereof, shall constitute a binding contract between us.

6. I/We understand that the Owner is not bound to accept the lowest or any of the tenders received.

7. I/We agree that if our tender is accepted , to refer all disputes relating to the agreement to arbitration by a sole arbitrator to be appointed by the Kerala Law Academy, Thiruvananthapuram in accordance with the conditions in the contract and they shall be deemed to have arisen within the jurisdiction of Thiruvananthapuram.

Date:

This day the _____ of _____ 2016.

Witness:

Tenderer:

(Signature)

(Signature)

Name: _____

Address: _____

Occupation: _____

The above tender is hereby accepted by me on behalf of the Owner on this day the _____ of 2016.

Witness:

Owner:

(Signature)

(Signature)

Name: _____

Address: _____

Occupation: _____

ARTICLES OF AGREEMENT

[The following articles of agreement shall be signed by the successful tenderer (Contractor) and the Owner on a non-judicial stamp paper. The stamp paper shall be purchased by the contractor at his expense.]

Articles of agreement made at _____ on this _____ day of _____ 2016 between **KERALA LAW ACADEMY** represented by its Secretary (hereafter referred to as Owner) on one part and Messrs _____ (hereafter referred to as Contractor).

Whereas the Owner desirous of Air conditioning of **KERALA LAW ACADEMY GUEST HOUSE in KLA – CALSAR - HEATHER TOWER at PUNNEN ROAD, NEAR GOVT. SECRETARIAT, THIRUVANANTHAPRAM** have prepared the drawings, specifications and schedule of quantities describing the work to be done, under the guidance of the project team.

Whereas the said drawings, specifications and the priced schedule of quantities have been signed by on behalf of both the Owner and the Contractor as parties hereto, a copy of which is appended hereto, which shall form part of this agreement in toto.

Whereas the Contractor has agreed to execute upon and subject to the conditions set herein, the works shown upon the said drawings and described in the said specifications and the priced schedule of quantities (hereafter referred to as The Conditions)

Whereas the Contractor has submitted the Initial Security Deposit of Rs. _____ (Rupees _____ only) in the form of _____

NOW IT IS HEREBY AGREED AS FOLLOWS

1. In consideration of payment to be made to the Contractor as hereafter provided he shall upon and subject to the said conditions execute and complete the works shown upon the said drawings and described in the said specifications and the priced schedule of quantities and such further detailed drawings and / or instructions as may be furnished to him by the project team/Owner.

2. The Owner shall pay the Contractor such sums as shall be payable to him in terms of the conditions at the time and in the manner specified in the conditions.

3. The Contractor is, as referred, to execute all works in Instructions to Tenderers and any other subsidiary works conducted within the same site as may be ordered by the HV/AC Consultant from time to time although such works may not be shown in the said drawings and described in the said specifications and the priced schedule of quantities.

4. The Owner through their project team reserve to themselves the right of altering the said drawings and nature of work and of adding to or omitting any items or works or of having portions of the same carried out departmentally or otherwise and such alterations or variations shall be carried out without prejudice to this contract

5. This contract comprises of the following documents:

Tender Notice, Instructions to Tenderers, Tender Form, Articles of agreement, Conditions for supply and erection contract, Technical specifications, Mode of measurement , List of Make of Material/Equipment in 25 sheets.

Basis of Design in 2 sheets

Schedule of quantities in 3 sheets.

Drawings in 6 sheets.

6. All the said documents shall be read and construed together as forming part of this contract and the parties hereto will respectively abide by and submit themselves to the conditions and stipulations and perform the contract on their parts respectively.

7 All disputes arising out of or in any way connected with this contract shall be decided by a sole arbitrator to be appointed by the Kerala Law Academy, Thiruvananthapuram in accordance with the conditions in the contract and shall be deemed to have arisen in Thiruvananthapuram and only the courts in Thiruvananthapuram shall have jurisdiction in the matter.

8. The several parts of this contract have been read and fully understood by me, the undersigned. In WITNESS whereof the parties hereto have hereunder set their hands this _____ day of _____ 2016

Owner:

(Signed by the said)

Contractor:

(Signed by the said)

In the presence of:

In the presence of:

Name:

Name:

Address:

Address:

Occupation:

Occupation:

CONDITIONS FOR SUPPLY AND COMMISSIONING OF CONTRACT

1. Conditions in conjunction with other documents:

Conditions of contract shall be read in conjunction with the Technical specifications, Drawings, schedule of quantities and other documents forming part of this contract wherever the context so requires.

2. Interpretations of terms

In this contract, these terms appearing in the tender notice, tender form, articles or agreement, instructions to tenderers, Conditions of the contract, technical specifications, schedule of quantities, drawings etc., will have the following interpretations as assigned to them as given below.

Owner shall mean **KERALA LAW ACADEMY** represented by its Secretary on whose behalf this tender / enquiry is floated and shall also include their officers, authorized representatives, legal representatives, assignees or successors. The technical team/HVAC consulting engineer of the owner shall mean the technical person who is so authorized by the Secretary of Kerala Law Academy. (The Present contract/project, Mr. Nidhin Asokan of Edge Consulting Engineers, Ernakulam is the technical person so authorized as the technical team/HVAC consulting engineer).

Contractor / HVAC Contractor shall mean the successful tenderer who has been awarded the Contract with whom the Owner is having a signed agreement on stamp paper.

3. Inspection of site before submission of tender :

The site is located at KLA – CALSAR - HEATHER TOWER at PUNNEN ROAD, NORTH OF GOVERNMENT SECRETARIAT, THIRUVANANTHAPURAM.

The Contractor must visit the site of work before submission of the tender to fully satisfy himself on all questions relating to and concerning the existing conditions of site and performance thereon. The dimensions, clearances, contours and the levels indicated in the drawings are approximate and tentative only, he must fully acquaint himself before submission of tender as to the facilities of site, limitations as to the extent and position of working space, the existing facilities like access, roads etc. for transportation of materials and storing and stacking the same at places within the site and for all other matters concerning the site and effecting the performance of the work. No claim shall be admitted on grounds of site visit as mentioned here above.

4. Admission to site

The Contractor will not be allowed to enter on or take possession of the site until instructed to do so by the HVAC Consulting Engineer / Owner. The Contractor shall provide all necessary temporary access roads to works as may be directed by the HVAC Consulting Engineer and shall adopt, alter and maintain the same as required and directed by the HVAC consulting Engineer during the currency of the works and shall clear away and make good on the completion of the works, all at his own expense and directed by the HVAC Consulting Engineer/Owner. No photographs of the site or of the works or any part thereof shall be taken, published, or otherwise circulated without the prior permission of the Owner. The HVAC Consulting Engineer shall have the power to exclude from the site any person whose admission thereto may be in his opinion undesirable for any reason whatsoever.

5. Stacking out base lines and levels:

The Contractor shall layout his work subject to the approval of the HVAC Consulting Engineer and shall be responsible for all measurements in connection herewith. The Contractor shall at his own expense furnish all stakes, platforms, equipment, ranges and labor that may be required in setting or laying any part of the work. The Contractor shall be held responsible for the proper execution of the work to such requirements as may be established or indicated on the drawing etc. The contractor shall check the bench marks, levels etc. established in the drawings before setting out any lines and levels and

shall provide necessary instruments found necessary for carrying out the work at his own expense.

If any discrepancies are found in levels, bench marks etc. the same shall be informed immediately in writing to the HVAC Consulting Engineer for his decision. The HVAC Consulting Engineer's decision in this regard shall be final and binding and no claim shall be admitted on any ground as stated here above.

6. Use of explosives:

The Contractor Shall have to obtain permission from the Owner before use of explosive on any work or on the site. If explosives are required for any work the same shall be stored in a special storage container to be provided by and at the cost of the contractor in accordance with the laws / rules relating to the possession and storage of explosives for the time being in force. The contractor shall forth obtain a license required by such law for the storage and use of explosives, and all operations in which or for which explosives are employed shall at the sole risk and responsibility of the Contractor and the Contractor shall fully and effectively indemnify the Owner. The Contractor shall be responsible for any accident to workmen, public or property due to blasting operations.

7. Make and other details of materials :

The contractor shall furnish a list of makes selected from the list of approved makes indicated in the tender as well as other details of various materials he proposes to use on the work and this would be subject to the approval of the HVAC Consulting Engineer.

8. List of machinery:

The Contractor shall, along with the tender submit a schedule of machinery and equipment he proposes to use at site in support of his assurances to adhere to the time schedule specified for the entire completion of work.

9. Engineers and overseers:

The contractor must employ his own qualified engineers and supervisors at site to supervise the workmanship as well as quality control of the materials for the entire duration of the project.. The day to day supervision required for smooth progress of the work is deemed responsibility of the Contractor.

10. Buffer period

No compensation will be levied from the contractor if the work is completed within 10 days after the due date of completion. This will be at the sole discretion of the Owner / HVAC Consulting Engineer. The tenderers shall have to quote for all the items in the schedules of quantities of the tender documents. Incomplete tenders are liable to be rejected. The tenderer shall quote balanced rates for all the items. The quantities given in the tender are merely for the guidance of the tenderer and may vary to either side up to any extent during actual execution. Some of the items may be added , deleted, omitted or altered during actual execution of work. . Speculative tender is liable to be rejected. The owners through their HVAC Consultant, reserve the right to award the work to one or more tenderers in part or in full. The owners' decision regarding splitting the work amongst more than one tenderer or otherwise shall be binding, conclusive and final. List of approved makes have been specified for various materials / items in the tender documents. HVAC Consultants at their discretion may make changes (add or delete) in such list during the execution of the contract.

11. Drawings:

The tender drawings which are available for study shall serve as the scope for the work. They indicate general layout of the site only, the actual location, distance, levels etc. will be governed by the field conditions. The Contractor shall check architectural, structural, water supply, drainage etc. plans to avoid possible installation conflicts. Should drastic changes from original plans be necessary to resolve such conflicts, the contractor shall notify the consultant and secure written approval on necessary

adjustment before the installation is started. Discrepancies shown on different plans or between plans and field conditions or between plans and specifications shall promptly be brought to the attention of the consultant, for decision.

12. Shop drawing

The Contractor shall submit to the HVAC Consultant detailed dimensioned shop drawings covering all items of ducting and diffusers, piping and valves, AHU location, plant room, electrical layouts etc.

No fabrication and installation should be put into execution until these shop drawings are approved by HVAC Consultant. The Contractor shall submit in duplicate the shop drawings prepared by him for checking and variation by the HVAC consultant. The Contractor shall then submit in duplicate corrected shop drawings for final approval.

13. Materials

All materials to be used in the installation shall be of the best quality conforming to the relevant I.S. specifications for items not specified. They must be products of reliable manufacturers of many years standing. All like parts of materials shall be interchangeable. Sample of materials wherever required should be approved by the Consultant before it is used in the installation.

14. Notice and fees:

The Contractor shall obtain and pay for all permits, licenses, certificates of approval required by all relevant authorities and/or organizations. All work of the Contractor shall conform to the requirements of local authorities.

15. Testing :

The Contractor shall solely be responsible for the testing and commissioning of those works covered by this specification in compliance with standard procedure.

16. Prices

The Contractor should quote for a firm price for all the items indicated in the schedule of quantities. The prices should be inclusive of all taxes and duties. No escalation of prices will be admissible for a period of 18 months.

17. Validity

The offer should be kept valid for a minimum period of 30(thirty) days or as indicated elsewhere in the Tender notice for acceptance.

18. Maintenance Period / Defects Liability Period

The maintenance period shall be 12months from the date of handing over of the site to the Owner by the Contractor after the completion of the work.

19. Period of final measurement

The final measurement shall be done within 15 days from the date of completion of the work which has to be informed to the Owner and the HVAC Consultant.

20. Payments

For payment, all necessary bills and dimension/ measurement sheets certified by the HVAC Consultant, shall be submitted to the Owner by the Contractor. Bills shall be submitted at a maximum of once a month.

a) For supply and commissioning of materials.

22. Work Programme

A detailed programme for the execution of the work shall be prepared by the Contractor and submitted to the project team within 7 days from the date of issue of letter of intent.

For Equipments:

- a) 50 % advance along with order.
- b) 50% against proof of dispatch.

For indigenous equipments:

- a) 20% of the contract value as advance along with the order
- b) 50% of the contract value against delivery of equipment, on pro-rata basis.
- c) 10% of the contract value on erection of equipment on pro-rata basis.
- d) 20% of the contract value against commissioning of the plant.

23. Site Work Co-ordination

The HVAC Contractor should co-ordinate with all the others works being carried out at the site so that conflicts are foreseen in advance. The work programme at the site should be prepared in advance and planned based on the completion date mentioned. If any information / work front / drawings are not available at the time of carrying out the work, these are to be informed to the Owner / Consultant immediately.

24. Rates quoted in the Tender documents

The rates quoted in the Tender documents should be inclusive of all taxes and duties. It shall be the exclusive responsibility of the Contractor to comply with all statutory obligations / formalities and make contributions to the concerned statutory authorities in connection with sales tax , PF act, ESI Act and / or any other statute for the time being in force. Copy of PF & ESI challans to be submitted to the owner every month during the work period. The Owner shall have absolute powers to recover from the Contractor any sum paid by the former to any statutory Authorities on behalf of the Contractor. TDS will be deducted from every payment as per provisions of Section 194C of the income tax act and the rules framed there under.

25.Limited possession of the site

Handing over the site will be after the execution of the agreement. By handing over the site the Contractor does not get any right for the exclusive possession of the site, but confers on him only the right to have limited use of such land for the purpose of executing the work. The same shall be treated as bearer's possess only. It will be in order, on the part of the owners, to hand over the site in parts, provided that the execution of the work in accordance with the approved program is not impeded by doing so.

26. Management of works

It is the responsibility of the contractor to manage the entire works to provide the results as contemplated herein. It is for him to plan, organize and execute the work and to manage the labor. The owner's responsibility is strictly limited to the obligations specified herein and for making payments for the finished works carried out. The maintenance of law and order at site will not be the responsibility of the owners. It shall be the responsibility of the contractor to maintain good relations with the labour and others and to maintain discipline of labour at site. Any problem of maintenance of law and order may be referred to the appropriate authority for redressal by the contractor forthwith so as not to endanger the progress of the work in any manner. The owners will not be responsible for any such problems. The contractor is bound to follow safety provisions applicable and follow the direction of the Engineer in charge in this regard. The cost of providing safety provisions shall be deemed to be included in the rates agreed to. The contractor is bound to follow necessary safeguards for environmental protection at no extra cost.

27. Subletting of contract

The contractor shall not ,without the consent in writing of the owner, assign or sublet his contract or any substantial part thereof other than for raw materials or minor details.

Consent for subletting shall not relieve the contractor from any obligation duty or responsibility under the contract.

28. Extra Items

An extra item of work is an item of work not expressed or provided for in the schedule of items, plans or specifications of contract. This will include only items of work which, though highly necessary for the proper execution of work and its completion, were not provided in the original contract.

29. Inspection

All materials and workmanship shall be subject to inspection, examination and testing by the engineer at any and all times during the manufacture and/or constructions are carried out. The cost of all such tests shall be borne by the contractor. The engineer shall have the right to reject defective materials and workmanship or require its correction. Rejected workmanship or materials shall be satisfactorily replaced with proper material without charge thereof and the contractor shall promptly segregate and remove the rejected materials from the premises at his own cost. If the contractor fails to proceed at once with the replacement of rejected materials and/or the correction of defective workmanship, the owners may contract or otherwise replace such materials and/or correct such workmanship and charge the cost thereof to the contractor and/or terminate the right of the contractor. Should it be considered necessary or advisable by the owners at any time before the final acceptance of the entire work to make an examination of the work completed by removing or tearing out the same, the contractor shall, on request, promptly furnish all necessary facilities, materials and labour. If the work or materials are found to be defective or not conforming to the specifications, contractors shall meet all expenses of such examination and satisfactory reconstruction.

30. Force Majeure

In case the owners are not able to discharge the obligations from time to time in respect of contract for reasons beyond their control, the contractor will not be eligible for any compensation.

31. Negligence

If the contractor neglects to execute the work with due diligence or contravenes the provisions of the contract, the owner may give notice in writing to the contractor calling upon him to make good the neglect or contravention complained of. If the contractor fails to comply with such notice within a stipulated time, the owner will have the option and be at liberty to terminate the contract and to take the work wholly or in part out of the contractor's hands and complete it either by himself or his agents at a reasonable price. The Owner will then be entitled to retain and apply any balance sum which may otherwise be then due on the contract from him to the contractor towards the payment of the cost of execution of such work as aforesaid. If the cost of execution exceeds the balance due to the contractor, the owner shall be at liberty to dispose of any of the contractor's materials or construction plant that may be at site and apply the proceeds for payment of the difference of such cost or recover the balance by process of law.

32. Works carried out at nights and holidays

Prior sanction of the engineer is required for carrying out works on Sundays, holidays and at nights. Whenever work is carried out at night adequate lighting of the working areas and access paths should be provided by the contractor at his cost.

33. Clean up of work site

During erection the contractor shall at all times keep the working and storage areas free from waste and rubbish. On completion of erection he shall remove all structures and debris and leave the premises in a satisfactory condition.

34. Liability for Damage to works or plants

The contractor shall, during the progress of the work, properly cover and protect the works and plants from damage by exposure to the weather and natural calamities, such as floods, rain or by any other cause, and shall take every reasonable, timely and proper precaution against accident or injury to the same from any cause. The contractor shall be and remain answerable and liable for all accidents or injuries which may arise by acts or omissions of the contractor or his supervisors, workmen or his subcontractors. All losses and damages to the work and plants arising from such accidents or damages shall be made good in the most complete and substantial manner by and at the sole cost of the contractor and to the reasonable satisfaction of the engineer. Should such losses or damages happen to the other units of work or plant or materials falling outside the scope of this contractor, they shall be replaced or compensated by the contractor to the satisfaction of the engineer. Until the work is or deemed to have been taken over, the contractor shall be liable or shall indemnify the owners in respect of all damages or injury to any person or to any property of the owner or of other occasioned by the act of the contractor or any member of his organization including his workmen or subcontractors, but not for reasons completely beyond his control.

35. Lien to withhold any payment due to the contractor

The owner shall have a lien on and over any money that may become due and/or on and over the security and retention deposits or amounts under the conditions of contract in respect of any debt or sum that may become due and payable to the government and owner by the contractor either alone or jointly with others and either under this or under any other contract or transaction of any nature whatsoever between the owner and the contractor and also in respect of any government tax or taxes or other money which may become due and payable to the government by the contractor under the provision of any law or regulations. The owner will at all times be entitled to deduct the said debt or sums or tax dues from the contractor from the money securities like bank guarantee or deposit which may become payable or refundable to the contractor.

36. Contractor's Risk

The contractor shall take upon himself the whole risk of executing the works and all materials obtained for the purpose of the contract and all works executed shall be at his risk till the expiry of the defect liability period.

37. Breach of Contract

If the contractor commits breach of all or any of the terms and conditions of contract, the Owner shall be entitled to recover from the contractor all damages he might suffer thereby. The amount thus due could be recovered from the contractor in any manner the Owner chooses, including withholding any amounts due to the contractor under this or any other contract or recovery of revenue recovery proceedings.

38. Release of security deposit

The security Deposit furnished by the contractor will be released after the project manager certifies that the contractor has performed the contract in a full and complete satisfactory manner.

39. Supervision of Works

The supervision of the works have been entrusted with the HVAC Consultant or any other persons assigned by him and all directions and instructions on technical and supervisory matters issued by the HVAC Consultant shall be considered as final.

40. Maintenance and Training of personnel

The contractor shall carry out all the maintenance work, without extra cost, for a period of 12 months after the installation is taken over by the owner/his assignee. If required by the owner/his assignee, the contractor shall also agree to train members of the

owner/his assignee either at his or his sub-contractor's place or places as may be considered suitable by the owner/his assignee.

41. Deduction of Income Tax and Works contract sales Tax

During the course of contract period, a deduction of Income tax shall be made as per statutory rule as prevailing or as per the statutory advice of the Tax authorities. A review of the liabilities will be made by the owner to satisfy himself of the position before making payment and any likely dues to the statutory department will be recovered from the bills. Any variation in the recovered amount will be reimbursed to the contractor on submission of proof by competent authorities.

42. Guarantee and Defects Liability Period

The contractor shall guarantee all equipment are free from any defect due to defective materials and poor workmanship, that the equipment operates satisfactorily and that the performance and efficiencies of the equipments are not less than the guaranteed values. The guarantee shall be valid for a period of 12 months after successful first seasonal testing and taking over and any part found defective shall be replaced free of all costs by the contractor. The services of the contractor's personnel if requisitioned during this period for such work shall be made available free of any cost to the owner. If the defects are not remedied within a stipulated time, the owner may proceed to do so at the contractor's risk and expense without prejudice to any other rights. The guarantee shall be extended to all the components, consumables, refrigerant gas & oil, V-belts etc.

43. Excluded Items of Work

The under mentioned works shall be arranged by the owner. However, the contractor shall furnish necessary drawings/instruction at appropriate times to enable the owner to arrange for the same.

1. Provisions of A/C, 1/3-phase 230/400v, 50Hz, 4 wire supply terminating in the air conditioning contractor's switch board/panel as given in the drawing.
2. All masonry and builder's work such as provision of suitable plant room, AHU room with adequate lighting and concrete supporting arrangement for Outdoor units and complete civil work.
3. Carpentry work such as false ceiling, work involved in duct concealment etc.
4. Shading for glasses wherever possible.
5. Making the air conditioning room air tight.
6. Insulation for exposed roof.
7. All electrical works.

44. Completion Time

Time allowed for completion will be 120 days from the date of letter of intent to commence work.

45. Design Parameters.

Outdoor Design Conditions

Dry Bulb Temperature 35.0 °C (95.0 °F)

Wet Bulb Temperature 27.7 °C (82.0 °F)

Ambient design conditions shall be as detailed below:

Inside Design Conditions

24.00 Deg C ± 1 Deg C DB,

Not exceeding 60% RH

46. Project Description

VRF System of 44 HP has been designed to provide year round thermal environmental control for Kerala law academy Guest house. The designated air-conditioned space (refer enclosed drawings) with comfort cooling so as to maintain inside conditions of Dry Bulb Temperature (DBT) of 24 ± 1 ° C, and not more than 60% Relative Humidity

TECHNICAL SPECIFICATIONS VRV/VRF (MULTI – SPLIT UNITS)

SCOPE OF Work

The Scope of this section comprises of Supply, Erection, Testing and Commissioning VRV/VRF Air Conditioning system including all Equipment, Components and Accessories.

Fully Imported VRV/VRF SYSTEM :-

- All Variable Refrigerant Volume Air Conditioners shall be fully imported all inverter type Factory assembled , wired, piped and tested (Japanese models of Mustibushi Electrical/ General/ Daikin).
- Each System shall comprise of Air Cooled Outdoor Units with single/ multiple inverter compressor, and a variety of Indoor units connected by common Refrigerant Piping, Power and Control Cabling.
- The Indoor Units are detailed below and the capacities of the units is listed in the BOQ.
- Refrigerant shall be R 410 A.

General Requirements :-

- The VRV/VRF System shall provide stable, trouble free and safe operations, and provide flexibility in operation of Indoor Units with independent control of each Indoor Unit, including partial operation.
- It shall be possible to switch on only those Indoor Units that require Cooling in individual areas.
- The System shall be capable of automatic operation even with varying Outdoor and Indoor requirements and make use of low Outdoor Temperatures to achieve lower Power Consumption, without any manual adjustments.
- Units shall have hermetically sealed inverter Scroll Compressors to ensure high EER.
- All Units shall be Air Cooled type.
- All Systems shall be designed for proper oil return to Compressor System, along with the distribution of oil to individual Compressors.

POWER SUPPLY:-

- All the units shall be suitable for operation with $415 \text{ V} \pm 10 \%$, $50 \text{ Hz} \pm 3 \%$, 3 Phase, 4 Wire A.C. Supply.

OUTDOOR UNITS :-

- Outdoor Units shall be able to operate over a range of Outdoor Ambient Temperatures up to 40° C .
- Outdoor Units shall have backup Systems built into the Units, to prevent total shut down of System, in case of individual Component failures, even when part of the Outdoor Units is out of Order.

- Provisions in Piping, cabling and controls shall be provided for repair of a part of the System when the rest of the System is operational.
- Anticorrosion treatment for Heat Exchanger Coils is mandatory. The treatment should be suitable for sea coast areas.
- All Casings, Fans, Motors, etc. shall also be with anticorrosion treatment as a standard feature, suitable for sea coast areas.
- All Outdoor Units shall be suitable for mounting, without any cover protection..
- Air Cooled Condensers shall have Axial flow, top discharge Fan, directly coupled to Fan Motors with IP 55 protection.
- Outdoor Units shall be suitable for connection to multiple Indoor Units of different capacities.
- All Equipment located outdoors shall withstand Rain, Wind, and Solar Radiation as prevailing
- in Tropical Countries.
- Units shall have standard Anti vibration connectors, mounts, etc.
- Noise level of Outdoor Units shall not exceed 62 dbA at 1 M and should be able to work at the silent Mode.
- Air Cooled Condensers shall have copper tubes with bonded Aluminum Fins using proper contact and large surface Areas.
- All Units shall be factory assembled, wired, piped and tested.

INDOOR UNITS :-

- All Indoor Units shall be factory assembled, wired, piped and tested.
- All Indoor Units shall have DX Coils with Copper Tubes and bonded Aluminum Fins for highly efficient Heat transfer.
- Indoor Units shall have Inlet Filters, which are easily cleanable or replaceable.
- All component of Indoor Units shall be easily accessible for connection, repairs and maintenance.
- All Indoor Units shall have very low noise, not exceeding 40 dbA for maximum capacity and size.
- Grills shall have auto swing feature for proper Air distribution for Factory manufactured Units.
- All Units mounted inside the Ceiling shall have Fans capable of sustaining Duct connections, and special Filters if necessary and adequate static.
- Visible Indoor Units shall have wireless remotes.
- All Units shall have adequate Insulation or Lining to avoid condensation.

CONTROLS: -

- All Units shall have Microprocessor Controls.
- Setting of addresses for each Unit should be automatic, and need not be programmed.
- Microprocessor should have 'Auto Check Function' to indicate Piping and Cabling errors to avoid malfunction.
- Control Units shall be central, suitable for ON / OFF and Temperature control of zones, including scheduling.

Malfunction and status display shall be available.

- Control Units shall be compatible with BMS of standard makes like MODBUS/LONWORKS/BACNET.
- Individual Controllers with wired or wireless remote for operation, status, etc. shall be used.
- Precision Temperature Control shall be mandatory with Electronic Expansion Valves adjusting to Load fluctuation and operating load fluctuation to maintain $\pm 0.5^{\circ}$ C, of set point.

- Microprocessor shall have pre set memory, which shall not be erased on power failures.
- All Units shall have "Self-Diagnostic Function" to pre warn of failures or problems, with function codes.
- All Controllers shall have digital indication.
- Power to the Control System shall be generated inside the Units from common Power source only.
- Control / communication wiring shall run in PVC conduits with markers.
- The system controller shall be able to lock / override the temperature settings of individual units.

PIPING :-

- All connections of Refrigerant Piping shall be in high grade Copper and copper pipes should not be lower than 19 G Hard Copper.
- All connections, Tees, Reducers, etc. shall be of proper quality.
- Insulation of Cold lines shall be carried out with suitable thickness Nitrile Rubber insulation Sheets and Tubes.
- Cold sticking compounds of Foster/IIDL or equivalent make shall be used for sticking Insulation.

CONDENSATE DRAIN PIPING :-

1" dia hard PVC Drain Pipe shall be used to remove condensate from Evaporator Unit to Drain point. The joints shall be properly sealed so that there is no water leakage . U trap shall be provided at the end. Additional insulated Drain tray shall be provided below the Evaporator Unit.

MOUNTING :-

All Indoor Units shall be mounted with Brackets, Hangers, etc. with proper size anchor Fasteners.

MATERIALS :

- All materials shall be of the best quality complying with the BIS (Bureau of Indian - Standards) specifications.
- Materials used shall be subject to the approval of the Construction Manager and samples of the same shall be furnished where required.

SHEET METAL DUCT WORK

SCOPE

This section covers the general design, materials, construction features, manufacture, shop inspection and testing at manufacturer's works, delivery at site, installation, testing, commissioning and carrying out performance test at site of Air Distribution system.

MATERIAL REQUIREMENT

Ducting shall be fabricated from Galvanised steel sheet (GSS). GSS duct shall be Machine Fabricated zinc coated conforming to IS 277.

Air velocity in ducts shall be limited to

Main supply duct	400 M/ MT
Branch supply duct	350 M/ MT
Exhaust duct	200 M/MT

CONSTRUCTION FEATURES

Fabrication details shall be generally in accordance with the details given here under

LARGER SIDE OF DUCT mm	THICKNESS OF SHEET mm/Gauge	TYPE OF REINFORCEMENT
Upto 750	0.63/ 24	C & SS Joint
751 to 1500	0.80 / 22	TDF Joints
1501 to 2250	1.00 / 20	TDF Joints
2251 and above	1.25 / 18	TDF Joints

DUCT SUPPORTS and HANGERS

Rectangular duct shall be supported from ceiling using trapeze hangers. Ducts shall rest on supporting GI Slotted angle or channel. The supporting angle or channel shall be supported by GI continuous threaded rods.

Supporting details for ducting shall be as given below.

LARGER SIDE OF DUCT mm	SUPPORTS Mm	VERTICAL ROD DIAMETER mm	MAXIMUM SPACING BETWEEN SUPPORTS mm
Upto 500	25 x 1.25	6	3000
501 to 900	25 x 1.5	8	3000
901 to 1500	32 x 2	8	3000
1501 to 2400	40 x 3	10	2400
2401 and above	40 x 4	10	2400

Steel anchor fasteners shall be provided by Contractor for duct hanging. Anchor fasteners shall be loaded to maximum 20% of the maximum rated capacity specified by the manufacturer. Site Engineer shall approve all anchor fasteners used for supporting duct.

TRANSFORMATION

Duct transformation shall be used to change the shape of duct and shall be made for easy and noiseless flow of air. Maximum slope of transformation shall be 1:4

ENDS, OFFSETS and BRANCH CONNECTIONS

All bends, offsets and branch connections shall be made for smooth and noise less flow of air and minimum pressure drop. In case of full radius elbow optimum ratio of centre line radius of elbow to duct dimension of 1.25 shall be considered. However, due to space constraint shorter radius constraint shorter radius elbow or square elbow with guide vanes may be provided. Contractor shall furnish the details of guide vanes i.e. number of vanes, location etc. in the drawing. All curved elbows shall be provided with air turning vanes consists of curved metal blades or vanes arranged so as to permit the air to make abrupt turns without appreciable turbulence. All right angle elbows shall be provided with turning vanes extending over at least 50 percent of the curvature of the elbow. The turning vanes shall have a flange covering the whole base be riveted to the duct at not more than 60 mm centers. Every duct tap-off from supply and return air duct shall be complete with opposed

blade volume control damper. A splitter damper or volume control damper shall regulate the flow of air to the branch duct.

SPLITTER DAMPERS and VOLUME CONTROL DAMPERS (VCDs)

Splitter dampers shall be fabricated of minimum 18G GSS and shall be of robust construction. The position of splitter damper shall be adjusted by use of the splitter rod. VCD shall be fabricated of minimum 18G GSS and shall be of robust construction. VCD shall be single blade type for round duct and opposed blade type for rectangular duct. VCD shall have a locking device mounted outside the duct to hold the VCD in a fixed position without vibration. Fully open and fully closed position shall be marked for easier operation of VCD. Volume control dampers shall be provided in every branch duct from individual main ducts. Volume control dampers shall also be provided in branch duct from main connecting to individual supply / exhaust air outlets, and inlets, fresh air intake duct, etc.

FIRE DAMPERS

All supply and return air ducts at plant room crossings shall be provided with fire dampers if called for. These shall be multi leaf dampers. Fire dampers blades and outer frames shall be of 16G GSS construction

ACCESS DOOR

Access door shall be provided in duct before and after equipment installed in duct and at all fire damper / duct damper locations. All access doors shall be fabricated of the same material as the duct work and shall have minimum two hinges.

DIFFUSERS AND GRILLES

The type and quantity of diffusers and grilles shall be aluminum extruded powder coated type. The contractor shall ensure that the diffusers and grilles offered are of requisite capacity, throw and terminal velocity. Whenever VCD is provided with diffusers or grilles it shall be located within the duct collar. Diffusers and grilles shall be of flush pattern. Ceiling diffuser shall be equipped with fixed air distribution grids, removable key operated volume control dampers. The extruded aluminum diffusers shall be provided with removable central core and concealed key operation for volume control damper. Slot diffuser shall be of extruded aluminum construction multi-slot type with air pattern controller provided in each slot. Supply air slot diffusers shall be provided with hit and miss VCDs in each slot. Grilles with VCD shall be double acting. Grilles without VCD shall have fixed blades. All diffusers, grilles and registers shall be of extruded aluminum construction, and epoxy powder coated. Aluminum registers, diffusers and grilles shall be approved by Architect. Architect shall approve the shade of epoxy powder coating for grilles, registers and diffusers. Fresh air grilles shall be of the fixed single louver type with opposed blade volume control dampers adjustable from the face of the grilles.

FRESH AIR INTAKES :

The fresh air intakes openings shall be made after approval from the architects and client. It shall be fitted with a volume control damper and bird and cowl screen. All bolts, nuts and washers used shall be non corrosive type.

TESTING :

After completion of entire ducting system, the same shall be tested for air leaks through joints etc.,

The entire distribution system shall be balanced to supply the air quantities as required. The final air quantities through each grill / diffuser shall be recorded and shall be submitted.

INSULATION

For Ducting – Thermal insulation

- ◆ Insulation material shall be Closed Cell Elastomeric Nitrile Rubber.
- ◆ Insulation material shall have Microban Certified anti-microbial product protection. The antimicrobial product protection shall be an integral part of insulation that is built-in

during the manufacturing process and the product protection should not allow the microbes to function, grow and reproduce.

- ◆ Resistance towards microbiological growth on insulation surface should confirm to following standards: Fungi Resistance – ASTM G21/C1 338 and Bacterial resistance – ASTM G 22.
- ◆ Thermal conductivity of Elastomeric Nitrile rubber shall not exceed 0.033 W/m^oK at an average temperature of 0°C.
- ◆ Water vapour permeability shall not exceed 1.74 x 10⁻¹⁴ Kg/m.s.Pa, i.e. Moisture Diffusion Resistance Factor or 'μ' value should be minimum 10,000
- ◆ Density of Material shall be between 40 to 60 Kg/m³.

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

External thermal insulation shall be provided as follow:

Following procedure shall be adhered to:

Duct surfaces shall be cleaned to remove all grease, oil, dirt, etc. prior to carrying out insulation work. Measurement of surface dimensions shall be taken properly to cut closed cell elastomeric rubbers sheets to size with sufficient allowance in dimension. Material shall be fitted under compression and no stretching of material shall be permitted. A thin film of adhesive shall be applied on the back of the insulating material sheet and then on to the metal surface. When adhesive is tack dry, insulating material sheet shall be placed in position and pressed firmly to achieve a good bond. All longitudinal and transverse joints shall be sealed as per manufacturer recommendations..

For Ducting – Acoustic insulation

Material shall be processed Open Cell Nitrile Rubber foam. The material should be fibre free. The density of the same shall be within 140-180 Kg/m³.The material should have a thermal conductivity not exceeding 0.048 W/mK @ 20 deg C. The maximum surface temperature the material should withstand is 105^o C and minimum temperature should be -20^oC. Thickness of the material shall be as specified for the individual application. The material should conform to Class 1 rating for surface spread of Flame as per BS 476 Part 7 and UL94(HBF,HF1 & HF2) in accordance to UL94,1996.The material shall have anti-microbial resistance properties – Fungi resistance in accordance to ASTM G21 and Bacterial resistance in accordance to ASTM E2180.The Tensile strength shall be 100 – 125 kPa in accordance to DIN EN ISO 1798.

Ducts so identified and marked on Drawings and included in Schedule of Quantities shall be provided with acoustic lining of thermal insulation material for a distance of minimum 5 meters (or 30% of the duct length whichever is more) as follows:

Cut foam sheets into required sizes and apply adhesive on the foam and stick it to the duct surface

TEST RESULTS

The following readings shall be recorded hourly during the tests and capacity of the plant shall be computed.

A.Compressor

- | | |
|------------------------|----------------------------|
| 1. Suction pressure | - Kg/Cm ² (psi) |
| 2. Discharge Pressure | - Kg/Cm ² (psi) |
| 3. Rated capacity | - HP |
| 4. Rated Volts | - Volts |
| 5. Rated current | - Amps |
| 6.Power Consumption at | - KWHr |

.
B Condenser

1. Refrigerant condensing pressure - Kg/cm² (psi)
2. Refrigerant condensing Tempr. - C (F)
3. Entering air tempr. - C (F)
4. Leaving air tempr. - C (F)
5. Pressure drop through condenser - Kg/cm² (psi)

.
C Motor

1. Rated Horse Power - HP
2. Rated Volts - Volts
3. Rated Current - Amps
4. Actual current - Amps
5. Actual Volts - Volts
6. Starting current - Amps
7. Power factor -

.
D. Supply Air Grilles

1. Area of Grill - m² (Sft)
2. Velocity - M/S (FPM)
3. Air flow rate - M³/Hr
4. Temperature DB - C (F)
5. Temperature WB - C (F)

E. Filters

1. Total area - m² (Sft)
2. Effective area - m² (Sft)
3. Velocity of air - M/S (CFM)

The observations of the test shall be recorded for each item separately.

MODE OF MEASUREMENT

The following measurement code shall apply to this contract:-

Sheet Metal Work

A. Ducting

i. All sheet metal ducting work will be measured in terms of final sheet area installed in Sq. Meters.

ii) No measurement of vanes, splitters, duct dampers, deflectors, access doors, etc. which are required to be installed in the duct work shall form part of the duct work.

iii.) Duct fittings such as bends, elbows, tap-off, collars, transformation pieces etc. shall be treated as ordinary duct pieces with their length measured along their center line.

iv) No duct supports, stiffening, members, etc. shall be measured separately. All such supports/hangers shall form part of duct work.

v). Equipment connections such as canvas/asbestos/resin shall be deemed to be part of the duct work and no separate measurement will be allowed.

B) Grilles/Diffusers

All grilles/Diffusers will be measured in terms of effective area.

C) Dampers

- i) All duct dampers shall form part of duct work, no separate measurement will be made for duct dampers.
- ii) Fire dampers will be measured in terms of effective area in Sq. metres.
- iii) Fresh air /exhaust air dampers will be measured as (ii) above. No separate measurement will be made for inlet/outlet louvers, bird screen etc.

D)Piping

- a) Piping will be measured in running length (metres)
- b) No special measurement of bends, elbows, reducer, expanders ,tees, cross etc. will be made. All such fittings/accessories will be treated as normal piping.
- c) The length of piping including accessories and fittings will be measured along the center line of piping.
- d) No measurement for flange, shall be made. All flanges shall form part of piping work.
- e) No measurement of pipe supports, hangers, anchors, etc. will be made. All such items shall be deemed to form part of piping work.

E) Insulation

a) Ducting Insulation

- i) Ducting insulation will be measured on the basis of center line of insulation and not the outer line of insulation.
- ii) No special measurement shall be made for insulation of bends, transformation pieces, tap off, elbows etc. All such insulation shall be treated as standard duct insulation.
- iii) Insulation item shall include all accessories and finishes as specified. No separate measurement will be made for such items.

LIST OF EQUIPMENT MAKES

VRF/VRV UNITS	Mitsubishi Electric / General/ Daikin (All fully imported)
GSS DUCTING	Jindal / TATA
GRILLES & DIFFUSERS	Dynacraft/ Airmaster/system air
NITRILE RUBBER INSULATION	Armaflex, K-flex
COPPER PIPING	Totaline/Rajco/Mandev
FRESH AIR / EXHAUST FANS	Systemair / Greenheck