TENDER DOCUMENT

Renovation of Water Lab
Supply, Installation, Testing and Commissioning (SITC)of Air Conditioning Mechanical Ventilation works

At

Central Pollution Control Board
Parivesh Bhawan, East Arjun Nagar
Delhi – 110 032

Central Pollution Control Board
Parivesh Bhawan, East Arjun Nagar
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CONTENTS

NOTICE INVITING TENDER

1. The Central Pollution Control Board (CPCB) invites sealed tenders in two bid system i.e. technical and financial bid separately from the manufacturer or authorized dealers for "Renovation of Water Lab-Supply, Installation, testing and Commissioning (SITC) of Air Conditioning Mechanical and Ventilation works" at 3rd floor in Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi-110032. The total estimated costs of the works is given below:

   Estimated Cost Rs. 76,62,750/-
   Earnest Money Rs. 1,53,255/- (to be submitted as Demand Draft in favour of the Central Pollution Control Board, Delhi)

2. The tenders, document will be available for sale from 10.00 a.m. to 5.00 p.m from 23.02.2012 to 14.03.2012 in the office of I/c, Building. The tender document can also be downloaded from CPCB website *www.cpcb.nic.in.* In case the tender document is downloaded from the website the bidder shall have to submit the document fee of Rs.1000/- as D.D. in favour of Central Pollution Control Board, Delhi at the time of submitting of the tender, failing which the tender will not be accepted.

3. The tender will be submitted upto 3.00 p.m. on 15.03.2012 in the Tender box lying at Ground floor near reception in Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi - 110 032 and will be opened on the same day at 3.30 p.m. at the same address.

4. DOCUMENTS REQUIRED TO BE ATTACHED WITH THE TECHNICAL BID:

Self attested copies of the following documents are to be annexed with the technical bid failing which the tender will be rejected.

(i) Should have manufacturer or authorised dealer of such type of ACMV system. Documentary evidence to be enclosed.
(ii) Should have completed atleast one work of similar nature not less than Rs.65.0 lakh in the last three year. (list to be enclosed)
Or
Completed two works of similar nature not less than Rs.50.0 Lakh each during last three years (list to be enclosed).
(iii) Should have authorized service center in Delhi or NCR.
(iv) Should have valid PAN no., Sale Tax registration no. and copy of ITR of last three year to be enclosed.
(v) Technical literature in respect of the system quoted for meeting the technical specifications.
(vi) Technical data sheet as enclosed in the tender document.
(vii) Should have annual turnover in the last three year minimum 04 crore per year. Documentary evidence to be enclosed.

5. MODE OF SUBMISSION OF TENDER

I. The tender shall be submitted in two separate sealed covers, duly completed in all respects viz. one for " technical bid ", the second for "price bid". The name of the work and the words " technical bid " and "price bid only", as the case may be shall be clearly written on the top of the respective sealed covers. All the two bids, along with the letter for submitting tender shall be put in a sealed cover and the name of the work "Renovation of Water Lab-SITC of ACMV works" shall be clearly written on top of the sealed cover.

6. The technical bid shall be complete in following:-

a) Complete tender document as purchased from CPCB/downloaded should be duly signed (each page) for acceptance of all terms and conditions.
b) All the documents as mentioned above point 4 (i) to (vii) of the tender document for fulfilling the eligibility criteria.
c) Earnest money amounting to Rs. 1,53,255/- (Rupees One Lacs Fifty Three Thousand Two Hundred Fifty Five only) as Demand Draft in favour of the Central Pollution Control Board, Delhi. Tender fee of Rs. 1000/- as DD in favour of CPCB if the tender is downloaded from CPCB website.

7. OPENING OF TENDER

The tender i.e. technical bid will be opened in Training Hall, Ground Floor, CPCB, at the time and on the date indicated above. The tenderers will be at liberty to be present either in person or through an authorized representative at the time of opening of the tenders.
The financial bid of only technically qualified firms will be opened.

8. The site for the work is available/or the site for the work shall be made available for inspection on all working days except on Saturday, Sunday and Public Holidays.

9. a) The contractor should quote in figures as well as in words the rate, and amount tendered by them. The amount for each item should be worked out and the requisite totals given.
b) Special care should be taken to write the rates in figures as well as in words, and the amounts in figures only in such a way that interpolation is not possible. The total amount should be written both in figures and in words. In case of figures, "Rs." should be written before the figures of rupees and "P" after the decimal figures, e.g. Rs. 2.15 P and in case of words, the word 'Rupees' should precede and the word "Paise" should be written at the end. Unless the rates is in only rupees and followed by the words 'only' it should invariably be upto two decimal place. While quoting the rate in schedule of quantities, the words 'only' should be written closely following the amount and it should not be written in the next line.

c) Rates quoted by the contractor in item rate tender in figures and works shall be accurately filled in so that there is no discrepancy in the rates figures and words. However, if a discrepancy is found the rates which correspond with an amount worked out by the contractor shall be taken as correct.
d) If the amount of an item is not worked out by the contractor it does not correspond with the rate written either in figure or in words than the rate quoted by the contractor in words shall be taken as correct.
e) 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. The contractor, whose tender is accepted (unless exempted) will be required to furnish by way of security deposit for the fulfillment of his contract such sum as will amount at the rate of 10% of the estimated cost put to tender subject to a maximum upto Rs. 8.00 lakhs.
The security deposit will be collected by deductions from the running bills of the contractor at the rate of 10%. The earnest money deposited at the time of tenders will be released after completion of work, no interest will be paid on it.
The security deposit will be released after the 'defects liability period' subjects to verification of defects. However, the security will be released if the firm/contractor submits the bank guarantee of the said security amount in favour of Central Pollution Control Board valid upto defect liability period.

11. The acceptance of a tender rests with the CPCB, which does not bind itself to accept the lowest tender and reserves itself the authority to reject any or all of the tenders received without assigning any reason. All tenders in whom any of the prescribed conditions are not fulfilled or are incomplete in any respect are liable to be rejected.

CPCB reserves itself the right to accepting the whole or any part of the tender and the tenderer shall be bound to perform the same at the rate quoted.

12. Canvassing in any form in connection with tender is strictly prohibited and the tenders submitted by the contractors who resort to be canvassing will be liable to rejection.

13. All rates to be quoted in the proper form in the tender.

14. Any item rate tender containing percentage below/above will be summarily rejected. However, where a tenderer voluntarily offers rebate or payment within a stipulated period, this may be considered.

15. On acceptance of the tender, the name of the accredited representative (s) of the contractor who would be responsible for taking instructions from CPCB shall be communicated to the CPCB.

16. Sales Tax or any other tax or liability in respect of this contract shall be payable by the contractor and CPCB will not entertain any claim whatsoever in this respect.

17. The tender for works shall remain open for acceptance for a period of 3 months from the date of opening of tenders. If any tenderer withdraws his tender before the said period or marks any modifications in the terms and conditions of the tender which are not acceptable to CPCB, without prejudice to any other right or remedy, CPCB will be at liberty to go for forfeiting the said earnest money absolutely.

18. It will be obligatory on the part of the tenderer to tender and sign the tender documents for all the components or parts and that after work is awarded, he will have to enter into an agreement for each component or part with CPCB.

19. The contractor should see the site and understand the work requirements and in case of doubt, obtain required particulars, which may in any way influence his tender, from the CPCB as no claim whatsoever will be entertained for any alleged ignorance thereof.

20. If it is found that the tender is not submitted in proper manner or contains too many corrections or absurd rates or amounts, it would be summarily rejected by CPCB.

21. Before submitting the tender, the contractor should visit the site and satisfy himself as to the conditions prevalent there.

22. The Contractor shall comply with the provision of the Apprentices Act, 1961, and the rules and orders issued there under from time to time. If fails to do so, his failure will be breach of the contract and the CPCB may in his discretion cancel the 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.

23. The contractor's responsibility for the contract shall commence from the date of issue of orders of acceptance of tender.

24. Unsealed tenders shall be summarily rejected.

25. Before tendering, the contractor shall inspect the site to fully acquaint himself about the condition in regard to accessibility of site and nature of ground, working condition including stacking of materials, installations of T & P etc. conditions affecting accommodation and movement of labour etc. required for the satisfactory execution of the work contract. No claim whatsoever on such account shall be entertained by the department in any circumstances.

26. The contractor shall submit list of works which have been handled by him in the previous financial year and on the works in hand (progress) in the forms given below.

Works Handled in the Previous Financial Year (2011-12)

Name of work	Name and particulars of place where work was done	Value of work	Position of works (In progress/completed)	Remarks
1	2	3	4	5

Works in Hand in the Present Financial Year (2012-13)

Name of work	Name and particulars of place where work was done	Value of work	Position of works (In progress/ completed)	Remarks
1	2	3	4	5

LETTER SUBMITTING TENDER

To
Member Secretary
Central Pollution Control Board
Parivesh Bhawan, East Arjun Nagar
Delhi – 110 032

Sir,

With reference to the tender invited by you for "Renovation of Water Lab-SITC of ACMV works" in 3rd floor at the Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi, I/We do hereby offer to execute the works under 'contract at the respective rates' mentioned in the Bill of Quantities. I/We have seen the site and read the articles of agreement, conditions of contract, specifications and special clauses forming part of the Bill of Quantities. I/We agree to finish the whole of the works within four months as specified in the tender.

I/We have deposited as Earnest Money Rs……. (Rupees …….. Only) by a Bank draft in favour of CPCB, which amount is not to bear any interest. I / We do hereby agree that this sum shall be forfeited by you in the event our tender is accepted and I /We fail to commence the contract when called upon to do so, within a period of one month after award of work.

I/We understand that you are not bound to accept the lowest or any tender that you receive.

Yours faithfully,

Name of partners of the firm.

Name of Bankers

Tenders submitted on …….

BILL OF QUANTITIES

	AIR CONDITIONING WORK – Part A				
S.No.	**Description of Items.**	**Unit**	**Qty.**	**Rate**	**Amount**
				INR	**INR**
1	Supply, Installation, Testing and Commissioning of Variable refrigerant flow modular type air- conditioning system suitable for Cooling/Heating by inverter driven capacity control compressor complete with indoor and outdoor units with individual controller and with fittings etc., as per quantity given below including full charging of R-410A refrigerant gas complete with duly powder coated and Outdoor unit having COP of min 4.8 at 50% Load and 35 deg C ambient temperature				
a)	Outdoor units.				
	20 HP	Nos.	3		
b)	Indoor Units				
	Supply, Installation, Testing and Commissioning of Indoor Units of the following type and Capacity (±5%) given below:				
	Hi-Static Ductable Indoor Unit With Drain Pump & Corded Remote				
i)	8.00 TR	Nos.	2		
ii)	6.30TR	Nos.	2		
iii)	2.30 TR	Nos.	2		
	Supply, Installation, Testing and Commissioning of Cassette Type Indoor Unit with Inbuilt Drain Pump of the following type and Capacity (±5%) given below:				
i)	3.50 TR	Nos.	2		
ii)	3.00 TR	Nos.	2		
iii)	2.30 TR	Nos.	1		
iv)	1.60 TR	Nos.	3		
v)	1.00 TR	Nos.	1		
	Supply, Installation, Testing and Commissioning of the following HRV Unit				
i)	1500 CMH	Nos.	2		
c)	Supply, Installation, Testing and Commissioning of Cordless Remote	Nos.	9		
d)	Supply, Installation, Testing and Commissioning of Corded Remote	Nos.	2		
e)	Supply, Installation, Testing and Commissioning of Simple central controller capable of controlling max. 16 Nos. of IDU.	Nos.	1		
f)	Supply, Installation, Testing and Commissioning of Refrigerant 'Y'Joint Required for distribution of refrigerant in copper piping stc complete as per specifications	Nos.	12		

2	**Refrigerant Piping**				
	Interconnecting refrigerant pipe work with (19mm/13 mm thick) closed cell elastomeric nitrile rubber tubular insulation between each set of indoor & outdoor units as per specifications, all piping inside the building shall be properly supported with MS hanger.				
2.1	41.3 mm OD (insulation 19mm)	Rm			
2.2	34.9 mm OD (insulation 19mm)	Rm	30		
2.3	28.58 mm OD (insulation 19mm)	Rm	60		
2.4	22.2 mm OD (insulation 19mm)	Rm	40		
2.5	19.05 mm OD (insulation 13mm)	Rm	70		
2.6	15.88 mm OD (insulation 13mm)	Rm	40		
2.7	12.7 mm OD (insulation 13mm)	Rm	120		
2.8	9.52 mm OD (insulation 13 mm)	Rm	70		
2.9	6.35 mm OD (insulation 13 mm)	Rm	40		
	Covered cable tray with GI Sheet cover for exposed piping	Rm	40		
3	**Drain Piping**				
	Rigid PVC piping complete with fittings, supports as per specifications and duly insulated with 6 mm thick closed cell nitrile rubber insulation.				
3.1	50 mm dia	Rm			
3.2	40 mm dia	Rm	25		
3.3	32 mm dia	Rm	20		
3.4	25 mm dia	Rm	35		
4	**Ducting**				
4.1	G.I. Sheet Metal Ducting (Rectangular)				
	Sheet metal handmade ducting complete with supports dampers etc. as per specifications & drawings.				
4.1.1	0.63 mm (24 Ga)	Sqm	225		
4.1.2	0.80 mm (22 Ga)	Sqm	60		
4.1.3	1.00 mm (20 Ga)	Sqm			
5	**Insulation**				
	Providing and fixing nitrile rubber insulation on ducts complete as per specifications and drawings.				
5.1	6 mm thick	Sqm	225		
6	**Duct Acoustic Lining**				
	Duct acoustic lining with glass wool insulation of 32 kg/m^3 density, covered with perforated aluminium sheet, tissue, nuts, bolts etc. complete as per specifications.				

6.1	25 mm	Sqm	60		
7	**Grilles/Diffusers**				
	Providing, fixing, testing and commissioning of grilles/ diffusers as per specifications and drawings including fixing frame of G.I./wooden in false ceiling/walls.				
7.1	Supply air grill with damper	Sqm	2		
7.2	Return air grill without damper	Sqm	2.5		
7.3	Supply air diffuser with damper	Sqm	4		
7.4	Return air diffuser without damper	Sqm	5		
8	**Volume Control Damper**				
	Providing and fixing G.I. Volume control damper in ducts complete as per specifications and drawings.	Sqm	2		
9	**Flexible Duct Connection**				
	Providing and fixing Fire retardant non porous double layer flexible connection between each Indoor unit/TFA/AHU and duct.	Sqm	5		
10	**Flexible Duct for HRV**				
	Providing and fixing of insulated flexible ducts for HRV units. The diameter of the ducts shall be as below:				
	350 mm	Rmt	15		
	300 mm	Rmt	10		
	250 mm	Rmt	20		
11	**Control & Transmission Wiring**				
	Providing & fixing control cum transmission wiring of 2 core x 1.5 sqmm copper in suitable PVC conduits between indoors and out door unit.	Rm	300		
12	**Controller Wiring**				
	Providing & fixing control wiring of 2 core x 1.5 sqmm copper between indoor units and their wired remote.	Rm	40		
13	Providing & fixing power wiring of copper 4 core x 25 sqmm	Rm	100		
	Weather Proof Isolators for ODU				
14	SITC of Weather proof isolators for isolating 3 Nos. of 20 HP ODU from the main supply of Panel.	Nos.	3		
	ODU Stand				
15	SITC of MS Stand for placement of ODU.	Nos.	3		
16	**Refrigerant Top-Up**				
	Charges for Refrigerant Top in the circuit	Lot	1		
17	**COLD ROOM**				

	Supply, installation, commissioning and Handing over of cold room, dimension of 2.826m (L) x 1.660m (D) x 2.250 m(H), The cold room include R-22 (30000 btu/hr) refrigerant multiple indoor evaporative cooling unit, air cooled condensing unit, front display with controller.				
	The Panel wall thickness will be 60-86mm, wall panel shall be of PPGI in side and out side as per spec. the scope of cold room will be inculde all wall, floor and ceiling panels, internal rack(Shelving) lamps, refrigerant pipes, inddor outdoor refrigerant equipments with all all necessary accessories as per specification.	Lot	1		
	The contractor shall take Buy back of existing system of COLD ROOM.	Lot	1		
18	**DX AC SPLIT UNITS**				
	Air cooled factory tested dx packaged unit and shall contain scroll compressor high efficient evaporator coil, hp/lp cut out contactors for the condenser fans sporian expansion valve, high efficient cooling coil etc. Reverse voltage indication with microprocessor based control panel shall be the part of the package. The unit shall comprise high efficient condenser coil fans and fan isolators. The fan motor speed shall not exceed more than 900 rpm and the noise to be below 55 db without ducting. Microprocessor based control panel with an inter locking arrangement and status indication of the compressor shall be part of the system.				
	2.0 TR (proposed UPS and IDF room) work only at night mode	No	2		
	The scope will including Installation of the above units with Testing , Commissioning & Gas charging, voltage stabilizers for the above units				
	Total Rs.				
	With 02 year additional warranty /Comprehensive AMC charges after one year warranty				
	Grand Total				

	MECHANICAL VENTILATION WORK- Part B					
S.N	**Description**	**Unit**	**Qty**	**Rate (Rs)**	**Rate in Words**	**Amount (Rs)**
	SUPPLY, INSTALLATION, TESTING, COMMISSIONING & HANDING OVER OF THE FOLLOWINGS (Suitable for Outdoor Installation)					
1.0	**SUPPLY AIR FANS**					
	All sheet metal double skin cabinet type Exhaust air unit, Fan section consisting of backward/ forward curved DIDW fan with motor, belt, with belt drive and motor located within casing, vibration isolators, fan outlet flexible connector etc.. The noise level of unit will be 70dB. The capacities and other details are as under:					
	The Unis shall consist of 3 stage of filter on the air entry of Cabinet fans, pre filter 10 micron(grade G3) fine filters of 5 micron (F5). The unit shall quoted with all filters with required all accessories.					
a	Air Quantity of 800 CFM, 40mm WG ESP, for Fresh water Heat area	No	1			
b	Air Quantity of 950 CFM, 40mm WG ESP, for Water purification Room	No	1			
c	Air Quantity of 800 CFM, 40mm WG ESP, for Heat area near by Soil & solid Waste	No	1			
d	Air Quantity of 1400 CFM, 40mm WG ESP, for Waster Lab	No	1			
2.0	**Wall Mounted Exhaust fans**					
a	Wall Mounted Aerofoil type Exhaust fans, shall be mounted on the wall, out side should have Auto Louver, Capacity of fan 600 cfm	No	1			
3.0	**SHEET METAL WORK**					
	Factory fabricated ducts, galvanized duct supports etc.. All ducts shall be factory fabricated and all flanges shall be factory fabricated. Provide 20 Gauge 40 x 40mm angle as reinforced frame for Duct. The reinforced frames					
	GI Ducting :					
a	24 Gauge	sqm	90			
b	22 Gauge	sqm	20			
c	20 Gauge	sqm	0			
4.0	**Extruded aluminum power coated Supply and exhaust Louvers.**					
a	Supply air Louver	sqm	5			
b	Exhaust air Louver	sqm	5			
c	450mm x 250mm or 300/450mm Access door (to release the FD by manually)	Nos	8			
d	MS Volume control damper for Ducts	sqm	2			
5.0	**Fire Dampers**					

	SITCH of Slab / Wall mounted Fire dampers of UL 555 Certification with Belimo Actuators actuated with the help of 24 V electric actuator and as per specifications excluding actuator inclusive of interconnection with Control Cable to actuator from Potential Free Contact in Fire Alarm Panel. (The control cable from Potential Free Contact of fire Panel has to be brought up to each AHU room by fire Alarm Contractor)					
a	For all ducts crossing the floors / external peripheral wall	sqm	4			
b	Linkage complete with Belimo Actuator	Nos	4			
6.0	**ELECTRICAL WORK**					
a	Panels					
	Supply, erection, testing, commissioning & handing over of MCCs as per specifications & comprising of MCCB's combination fuse switch units, MCBs, contactors, overload relays, control transformers, current transformers, relays, timers, ammeters, voltmeters, kW hour meter, LED type indicating lamps, push buttons etc,.complete in 16 G MS cubical type panel with horizontal & vertical bus bars, bus bar chamber, earth bus cable alley, hinged doors 75x50mm MS base frame etc,.					
	MCC - 1 (as per specification) for Exhaust fans	set	4			
b	Push button station:					
	Supply, fixing testing & commissioning of pushbutton station complete with 1 no. ON push button & 1 No.OFF push button with key etc,. Complete, housed in 16G MS / CI box grouted to brick wall for fan motors	Nos	4			
c	LT Power cables					
	Supply & laying of 1100 V, medium voltage, PVC insulated multicore copper conductor cables conforming to IS 694 /1990. The cables shall be laid on cable trays.					
	3 C 6 Sqm copper cable	m				
	3 C 4 Sqm copper cable	m	100			
	3 C 2.5 Sqm copper cable	m	200			
	3 C 1.5 Sqm copper cable	m	400			
d	Control cables:					
	Supply & laying of copper conductor control cables as per specification. The cable shall be laid as indicated above for remote Push Button stations. The cable shall be laid indoor / outdoor on cable tray / wall.					
	4 C 2.5 Sqm	m	600			
e	LT Cable End Terminations:					
	Supply & providing cable end terminations for power & control cables using tinned copper lugs, compressed brass glands, taping, griping, individual earthing of glands etc,. Complete for the listed cables:					
	Power cable 3 C 6 Sqm	Nos	4			
	Power cable 3 C 1.5 Sqm	Nos	4			
	Control cable 4 C 4 Sqm	Nos	1			
	Control cable 4 C 2.5 Sqm	Nos	1			
f	Earthing Conductors :					

	Supply & providing Electrolytic copper earth conductors along with cables on cable trays / wall. All joints shall be brazed. Equipment earthing shall be through earthing sockets.					
	25 x 3 mm copper flat	m	60			
g	Supply end erection of profab or equivalent make perforated GI slotted ladder type cable trays of the following sizes. The rate quoted shall included bends, offsets, Tees, etc,.					
	150mm Wide x 75 mm high	m	30			
	300mm Wide x 50mm high	m	40			
h	MS supports for cable Trays using angles, Channels, Tees, Flats. Etc,. All MS supports shall be of synthetic enamel paint of approved colour.	sqm	80			
	Total					
	With 02 year additional warranty/Comprehensive AMC charges after one year warranty period					
	Grand Total					

	Notes :-					
1.1	**The price shall be quoted on works contract basis, delivered, erected, tested, commissioned and handed over at site, All items of work like customs duty excise duty, sales tax, VAT etc., If any shall be deemed to have been included within the quoted price.** **All civil work related to installation of the system should be in the scope of HVAC firm/contractor.** **The rates of the additional warranty/Comprehensive AMC charges of Part A and B above will be come into force after completion of warranty period of one year and the contract will be made on the approved rates as quoted by the bidder in the tender.**					
1.2	Tax on work contract, if applicable, shall be indicated separately, further all details of application of such tax shall be furnished in details					
1.3	Prices shall be firm throughout the period the contract is in force					
1.4	The tenderes shall furnish without fail item wise break-up of prices as shown in the price schedule.					
1.5	The Unit rates shall apply of any variation in items of work like ducting, piping, insulation, cables, cable trays, earthing conductors. Etc,. Prices shall be firm throughout the period the contract is in force					

The drawings are attached with the tender document and will be issued at the time of purchase of tender. However, interested bidder can see the drawings in the office of I/c, building before purchase of tender.

SECTION- 1

GENERAL

About Project:

- This CPCB (PARIVESH BHAWAN) building is renovation project from existing building, the location of the building is Delhi. This covers complete air-conditioning and mechanical ventilation services. This project will be taken up in phases and the phases are planned 3 rd floor, 4th floor Air lab and 4th floor Treatability lab. The existing building is GF+5+Terrce floors and the ceiling height is approximately 3.5 to 3.2 m. Total building height is16m.

- All commercial floors are occupied by CPCB- Government of INDIA. The Purposes of the building is official and related Laboratories.

- The First phase of this project will be 3rd floor water Laboratory, where Fresh water Laboratory , Waste water laboratory, department heads and workstations for staffs. The area of 3 rd floor laboratory is 621 sqm. The dimensions is 54m x 11.5m

GENERAL

- All workmanship and materials used in the installation shall be of the highest quality and, where not fully covered by this Specification, shall conform with best modern practice, as determined by the Engineer.

- The entire installation shall comply fully with all relevant requirements of governmental and local authorities and the equipment provided for the installation shall comply in all respects.

- All electrical work associated with the installation shall comply with the requirements of the Municipal Authorities and be carried out in accordance with the "Standard Regulations".

- Alternative equipment, materials or apparatus from those that are noted or required on the drawings and/or in the Specifications, may only be offered and supplied on the written approval of such equipment, material or apparatus by the Engineer.

- In cases where all the necessary information is not supplied by the tendered, then the Engineer's decision shall be final.

- The materials and works shall be in accordance with the following standards and codes of practice where applicable:

It is renovation project from existing building, the location of the building is New Delhi. This covers complete air-conditioning and mechanical ventilation services. This project will be taken up in phases and the phases are planned 3 rd floor, 4th floor Air lab and 4th floor Treatability lab. The existing building is GF+5+Terrce floors and the ceiling height is approximately 3.5 to 3.2 m. Total building height is16m.
In the first phase only 3 rd floor water laboratory, where Fresh water laboratory , Waste water laboratory, department heads and workstations for staffs. The area of 3 rd floor laboratory is 621 sqm. The dimensions is 54m x 11.5m.

BASIS OF DESIGN

It is proposed to Supply, install, test and commission Air-conditioning system, Variable Refrigerant Volume / Flow of 60 HP

Nominal capacity at the above premises.

1. The Air-conditioning System shall comprise of:

a) 3 Nos. x 20 HP, Nominal Capacity Cool Heat Pump Type (Cooling & Heating) VRF System.

b) 15 Nos. Indoor Units.

c) G.S.S. Ducting For Supply & Fresh Air.

d) Copper refrigerant piping with close cell insulation.

e) Drain water piping duly insulated.

f) All other items as detailed in "Bill of Quantities."

2. GENERAL

The special conditions of contract given below shall be read in conjunction with the other documents forming part of the contract.

The materials, design and workmanship shall satisfy the specifications contained herein and codes referred to. Where the technical specifications stipulate the requirement in addition to those contained in the Standard Codes and specifications those additional requirements shall also be satisfied. In the absence of any Standard / Specifications covering any part of the work covered in this tender document, the instructions/directions of engineer-in-charge will be binding on the contractor.

All HVAC installations shall be of high quality, complete and dully operational including all necessary items and accessories whether or not specified herein. All HVAC work shall be completed in accordance with the regulations and standard to the satisfaction of the Engineer-in-charge.

BASIS OF DESIGN

A.	Outside Design Conditions	DBT °C	WBT °C
	Summer / Monsoon / winter	43.3/35/7.2	23.9/28.3/5
B.	Inside Design Conditions	DBT °C	RH
	Summer / Monsoon	23± 1	Around 60%
	Winter	Not to fall below 21 °C	

C. POWER SUPPLY:

Stabilised three phase four wire AC supply i.e. 415 Volts ± 10 % & 50 Hz ± 5 % with double earthing shall be made available near each outdoor unit & Single-phase power supply with earthing near each indoor units.

STANDARD SPECIFICATION

SCOPE OF WORK

The complete scope of work shall cover supply, installation, testing and commissioning of the entire HVAC system as detailed under specification.

BASIS OF DESIGN

The entire system has been based and designed on climatologically data available as given under Basis of Design and Scheme.

TERMS AND DEFINATIONS

The followings terms have been used in the tender specifications, drawings etc.

ISI	Bureau of Indian Standards.
ASHRAE	American Society of Heating Refrigeration & Air-conditioning Engineers, USA.
ASME	American Society of Mechanical Engineers.
ASA	American Standard Association.
B.S	British Standards
CMH	Cubic Meter per Hour
US GPM	US Gallons per minute.
IGPM	Imperial Gallons per Minute
RPM	Revolutions per Minute.
BTU/Hr	British Thermal Unit per Hour
Kcal/Hr	Kilo Calories per Hour
HZ	Hertz.
H.P.	Horse Power
Kg/Cm2	Kilo Gram per Square Centimeter.
SAG	Supply Air Grills.
SAD	Supply Air Diffuser.
SAF	Supply Air Filters.
FD	Fire Damper.
VCD	Volume Control Damper.
RAD	Return Air Damper.
FAD	Fresh Air Damper.
RH	Relative Humidity.
DB	Dry Bulb Temperature.
WB	Wet Bulb Temperature.
MV	Mechanical Ventilation.
DP	Drain Point.
VRV	Variable Refrigerant Volume

The codes, regulation as detailed below shall be followed in this contract:-

1.	Safety code for air-conditioning(Revised) amendment 1	IS 659: 1964 (re-affirmed 1991)
2.	Safety code for mechanical Refrigeration	IS 660: 1963 (re-affirmed 1991)
3.	Testing of refrigeration Compressors	IS 5111: 1993
4.	Air-cooled heat exchanger (Amendment 1)	IS 10470: 1983 (Re-affirmed 1991)
5.	Thermostats for use in Refrigeration	IS 11338: 1965 (Re-affirmed 1991)
6.	Metal Duct Work	IS 655: 1963 (re-affirmed 1991)
7.	Steel for general structural Purpose	IS 2062: 1992
8.	Welding	IS: 3589
9.	Refrigeration Air-conditioning & Refrigeration Air-	as per ASHRAE / ISI

	conditioning institute Standards.	
10.	Hot Dip Zinc Coated Steel Tubes	IS 4736: 1968
11.	Colour code for the identification Of pipe lines	IS 2379: 1963
12.	Specific requirements for the direct switching of the individual motors.	IS 4064 (Part II) 1978
13.	PVC insulated (HD) Electric Cables for working voltage up Including 1100 Volts.	IS: 1554 (Part I)
14.	HRC Cartridge fuse links up to 650 Volts.	IS 2208: 1976
15.	Starter	IS 8554 (Part I) 1979
16.	Inspection and testing of installation	IS 732 (Part III) 1979
17.	PVC insulated (heavy duty) Cables for working voltage up to 1.1. KV and up to 11 KV Grade respectively.	IS 1554: 1981 Part I & II
18.	Code for practice for electrical wiring installations.	IS 732: 1989
19.	Code for practice for earthing	IS 3043: 1966
20.	Wrought aluminum & aluminum alloy sheet and strip for general engineering purposes.	IS: 737
21.	Mild steel tubes, tublar and other wrought steel fittings.	IS: 1239
22.	Contactors for A.C for voltage up to 1100 V.	IS 2959: 1975
23.	Low voltage switch gear and control gear assemblies.	IS 8623: 1993 Part I & II
24.	Code of practice for selection of starters for AC induction motors	IS 3914
25.	Specification for cables glands	IS 4821
26.	Code for selection, installation & maintenance of switch gear and control gear.	IS 10118: 1982 Part I to IV
27.	Conduits for electrical installations	IS 9537: 1981 Part I to IV
28.	Permissible limits of noise lave for rotating electrical machines	IS 12065: 1987
29.	Code of practice for installation and maintenance of motors	IS 3106: 1966
30.	Unbounded glass wool for thermal insulation (1st. Revision)	IS 3690: 1974

2.40 SAFTEY CODES

The following IS codes shall be followed:

- Safety code for mechanical refrigeration IS 660
- Safety code for air conditioning IS 659
- Safety code for scaffolds & ladders IS 3696
- Code of practice for fire precaution in IS 3016
- Welding & cutting operations

Code for safety procedures and practices IS 5216
In electrical works

- Code of practice for safety and health IS 3696

Requirements in electrical & gas welding
And cutting operations.

2.50 INVERTER BASED VRF MACHINE

All shop drawings shall be prepared by the HVAC Contractor after examining the Architectural drawings, site conditions and consultant's tentative layout plans.

STANDARD SPECIFICATION OF VARIABLE REFRIGERANT VOLUME / FLOW SYSTEM (OUTDOOR UNIT)

The specifications under this section cover the supply, installation, testing and commissioning of the VARIABLE REFRIGERANT VOLUME / FLOW SYSTEM conforming to these specifications and in accordance with the Detailed Bill of Quantities given in the tender.
General

Each VRV / VRF Unit shall be air cooled, split type multi-system air conditioner consisting of outdoor units and number of indoor units, each having capability to cool and heat for the requirements of the individual area to be air-conditioned. The VRV / VRF unit should be capable of connecting minimum ten different types of indoor units to one refrigerant circuit and controlled individually.

Each VRV / VRF ODU unit shall have minimum two number scroll compressor and out of which one number Compressor is constant speed type and one shall be inverter Compressor (With inverter control) and capable of changing the rotating speed to follow variations in cooling loads. Each indoor units having capability to cool or heat for the requirement of the rooms.

Compressor shall be inverter controlled. Compressor installed in each outdoor unit shall be equipped with at least one inverter compressor in bigger machines for higher reliability, improved life, better backup and duty cycling purpose. The system shall be capable of changing the rotating speed of inverter compressor by inverter controller to follow variations in cooling and heating load.

The Outdoor units shall be suitable for mix-match connection of following type.

- Ceiling mounted cassette type (Double flow)
- Ceiling mounted cassette type (Multi flow)
- Ceiling mounted duct type.
- Ceiling suspended type.
- Wall mounted type
- Floor standing type
- Concealed floor standing type.

Please note that the refrigerant piping shall be capable of extending up to 100m with 50m level difference without any oil traps.

Both indoor and outdoor units shall be factory assembled, tested and filled with first charge of refrigerant. These being very hi-tech in construction with lots of factory checks being conducted, hence no sub assembly should be done at site preferably.

OUTDOOR UNIT

The outdoor unit shall be factory assembled, weather proof casing, constructed from heavy gauge mild steel panels and coated with baked enamel finish. The unit should be completely factory wired tested with all necessary controls tested prior to dispatch conforming to the following specifications.

a. All outdoor units shall consist of minimum two scroll compressors, one with inverter drive, capable to operate even when one compressor is unserviceable.
b. Outdoor units should be rugged of anti-corrosion design and should have strong base plate for easy mounting of unit.
d. The outdoor unit shall comprise of sub-cooling feature to effectively use the entire coil surface through proper circuit/bridge in order to prevent flushing of refrigerant owing to large length of piping.
e. The condensing unit shall be provided with state-of-the-art microprocessor based control panel.
f. The outdoor unit shall be provided with provided with Aero spiral design fan exhibiting low noise level characteristics complete with aero fitting grille to facilitate spiral discharge of airflow to effect reduction in pressure losses. The fan should be capable to respond to external static pressure of 5mm.

g. Motor shall be speed controlled to ensure a stable operation for varying ambient; by a factory fitted direct acting head pressure activated variable speed drive to give precise discharge pressure and minimum power consumption of condenser fan motor.
h. The condenser shall be complete with provisions for refrigerant piping connections, shut off valves and any other standard accessories necessary with the equipment supplied.

The condensing unit shall be designed to facilitate fail safe operation when connected to multiple indoor units. If working on higher operating pressures, vendor to comply with all safety codes of high pressure safety & testing as recommended by Japanese (being Japanese design product) and give 2 sets of special tools to handle such equipment at site. All brazing should be done by only qualified trained person who had training on HIGH PRESSURE brazing, special tools & procedures.

SCROLL COMPRESSOR

The scroll compressor shall be an industrial quality rugged, cast iron, direct hermetic compressor with scroll plates, suction & discharge service valves. The compressor shall be completely enclosed in a chamber with no leakage path and providing the capability for scroll plates to separate. The compressor shall be provided with industrial solid motor mounts internal motor protection and vibration isolation pads. Each compressor shall be independently wired and piped to its own circuit for efficient operation & ease of maintenance. The compressor used in the system is of OEM make only.
The compressor shall be highly efficient inverter control type. The inverter compressor shall change the speed in accordance to the variation in cooling or heating load requirement:

a) All outdoor units shall have multiple steps of capacity control to meet load fluctuation and indoor unit individual control. All parts of compressor shall be sufficiently lubricated stock. Forced lubrication may also be employed.

b) Oil heater shall be provided in the compressor casing.

c) The inverter compressor shall preferably be efficient & reliable inverter compressor.

HEAT EXCHANGER

The heat exchanger shall be constructed with copper tubes mechanically bonded to aluminum fins to form a cross fin coil.

a) The aluminum fins shall be covered by anti-corrosion resin film.

b) The unit should be with heat exchanger to optimize the path of heat exchanger and for better efficiency of condenser.

c) The unit shall be provided with necessary number of direct driven low noise level propeller type fans arranged for vertical discharge. Each fan shall have a safety guard.

REFRIGERANT CIRCUIT

The refrigerant circuit shall include liquid & gas shut-off valves and a solenoid valves at condenser end. The equipment must have inbuilt refrigerant stabilization control for proper refrigerant distribution.

All necessary safety devices shall be provided to ensure the safely operation of the system.

REFRIGERANT

The VRV / VRF units shall be selected on R-410A refrigerant. The units should be fully factory charged with refrigerant & oil & spare refrigerant & oil must be sent along with the machine for topping up of gas & oil as may be required.

SAFETY DEVICES

All necessary safety devices shall be provided to ensure safe operation of the system.
Following safety devices shall be integral part of the outdoor unit:

- High pressure switch
- Fan drive overload protection switch
- Fusible plug

- Overload relay including overload protection for inverter driven compressor.

OIL RECOVERY SYSTEM

Entire system shall be designed and capable of oil recovery to ensure stable operation with long refrigeration piping lengths. The system should have inbuilt (avoid external) oil balancing circuit to avoid poor lubrication.

STANDARD SPECIFICATION OF INDOOR UNITS

INDOOR UNITS

This section deals with supply, erection, testing and commissioning of Various Type of Indoor Units confirming to general specification and suitable for the duty selected. The type, capacity and size of indoor units shall be as specified in Detailed Bill of Quantities.

GENERAL

Indoor units shall be either ceiling mounted cassette type, or ceiling mounted ductable type or floor standing type or wall mounted type or other as specified in BOQ. Each unit shall have electronic control valve to control refrigerant flow rate respond to load variations of the room.

a) The address of the indoor unit shall be set automatically in case of individual and group control

b) In case of centralized control, it shall be set by liquid crystal remote controller.

The fan shall be dual suction, aerodynamically designed turbo, multi blade type, statically & dynamically balanced to ensure low noise and vibration free operation of the system. The fan shall be direct driven type, mounted directly on motor shaft having supported from housing.

The cooling coil shall be made out of seamless copper tubes and have continuous aluminum fins. The fins shall be spaced by collars forming an integral part. The tubes shall be staggered in the direction of airflow. The tubes shall be hydraulically/ mechanically expanded for minimum thermal contact resistance with fins. Each coil shall be factory tested at 21kg/sqm air pressure under water.

Unit shall have cleanable type filter fixed to an integrally moulded plastic frame. The filter shall be slide away type and neatly inserted.

Each indoor unit shall have computerized PID control for maintaining design room temperature. Each unit shall be provided with microprocessor thermostat for cooling or cooling and heating.

Each unit shall be with wired LCD type remote controller. The remote controller shall memorize the latest malfunction code for easy maintenance. The controller shall have self-diagnostic features for easy and quick maintenance and service. The controller shall be able to change fan speed and angle of swing flap individually as per requirement.

CEILING MOIUNTED CASSETTE TYPE UNIT (MULTI FLOW TYPE)

The unit shall be ceiling mounted type. The unit shall include pre-filter, fan section and DX-coil section. The housing of the unit shall be powder coated galvanized steel. The body shall be light in weight and shall be able to suspend from four corners. The fan shall be aerodynamically designed diffuser turbo fan type. Also Units shall have an external attractive panel for supply and return air. Unit shall have four way supply air grilles on sides and return air grille in center.
Each unit shall have high lift drain pump, fresh air intake provision (if specified) and very low operating sound.

All the indoor units regardless of their difference in capacity should have same decorative panel size for harmonious aesthetic point of view. It should have provision of connecting branch ducts.

CEILING MOUNTED DUCTABLE TYPE UNIT

Unit shall be suitable for ceiling mounted type. The unit shall include pre filter, fan section & DX coil section .The housing of unit shall be light weight powder coated galvanized steel. The unit shall have high static fan for Ductable arrangement. Ductable unit shall have provision of inbuilt drain pump capable of lifting condensate upto 600mm.

CEILING SUSPENDED TYPE

Unit shall be suitable for ceiling suspended arrangement below false ceiling. The unit includes pre filter, fan section & DX coil section. The housing of unit shall be light weight powder coated galvanized steel Ductable unit shall have provision of inbuilt drain pump capable of lifting condensate upto 600mm.

HIGH WALL MOUNTED UNITS

The units shall be wall-mounted type. The unit includes pre filter, fan section & DX coil section. The housing of unit shall be light weight powder coated galvanized steel.
Unit shall have an attractive external casing for supply and return air.

FLOOR STANDING TYPE

Unit shall be suitable for floor standing arrangement. The unit includes pre filter, fan section & DX coil section. The housing of unit shall be light weight powder coated galvanized steel.

SIMPLE CENTRAL CONTROLLER

A ON/OFF type simple centralized controller shall be provided with the system. The controller should be able to act as an advanced air-conditioning management system to give on/off type control of VRV / VRF air-conditioning Equipment, It should have ease of use for the user and must be user friendly.

It shall be able to control up to maximum 16 Nos. of indoor units with the undergiven function:-

a) Starting/stopping of Air-conditioners as a zone or group .

COLOUR

The colour of indoor units should be white or to suit interiors as designed by the architects / clients.

NOISE AND VIBRATION CONTROLS

The air conditioning contractor must take all necessary precautions to have minimum noise generation and its transmission. Minimum vibration as permitted by IS relevant code shall be ensured. A few points for guidance only are given below:

a) Double fire retardant flexible connections shall be provided from air discharge to outlet of air-handler to the duct.

b) Vibration isolation pads of suitable thickness commensurate to loading for isolation of vibration shall be provided under all VRV systems. in consultation with manufacturer for proper selection of vibration isolators

c) Flexible conduit connections of minimum diameter of 50mm to motors shall be provided. All loops should be large enough to allow connections to remain flexible.

d) All conduit connection where conduits are 60mm or larger shall be made of 1.2 meters minimum length conduit installed in the shape of U and grossly slack to provide maximum vibration isolation.

e) Operating clearance of 40mm shall be kept between the base and the inertia base.

f) All items suspended from false ceiling shall be isolated on separate hangers.

g) In case of ducts, conduits, pipes & tubes the annular space between construction and penetrating element shall be sealed with sand cement plaster.

h) All duct starting from fresh air fan unit shall be provided with acoustic lining. The duct lining shall be 12mm thick fibre glass rigid board with a density of 48 kg/cubic meter.

i) The air-conditioning contractor shall take all other precautions or shall make his own arrangements even if not specified in the tender documents for eliminating high noise levels & shall minimize vibrations in all mechanical equipments without any additional cost.

STANDARD SPECIFICATION OF THERMAL / ACOUSTIC INSULATION

This section deals with supply and fixing of thermal / acoustic insulation of ducts, pipes etc. as per the specification given in this section.

THERMAL DUCT INSULATION

Non Exposed Duct Insulation

Fixing of external thermal insulation on ducts with Closed Cell Nitrile Rubber of density 50 Kg/m^3 with 6 mm thick & thermal Conductivity. is 0.035 W/m^2K at a Temperature of 0°C. The Material Shall be rated as Class O. As per the building regulation (England & Wales). Fire Propagation shall be less than or equal to BS 476 PART 7 : 1997. Adhesive used for setting the insulation shall be non - flammable, Vapour Proof.

To be applied by manufacturer approved adhesive and installation team. All Joints should be sealed with 50 mm same tape and Flange to be overlapped by 6" width of the same material thickness. Finally Duct insulated should be strapped by 12 mm Plastic Packing strip at every random meter

DUCT LINING ACOUSTIC INSULATION

RESIN BONDED FIBRE GLASS WOOL

The Thermal conductivity values in W/m.K of fiber glass shall confirm to following:

Mean Temperature °C	Density in Kg / Cmt.	Thermal Conductivity W/m.k
For Duct Lining		
➢ 25 C	32	0.030
➢ 50 C	32	0.033

INSULATION ON SHEET METAL DUCTING

The thickness of insulation used on ducting shall be as detailed below:

Supply Air Duct

Insulated with 6 mm thick Closed Cell Nitrile Rubber. Insulation shown in the tender drawing

Fresh Air Duct

Insulated with 6 mm thick Closed Cell Cross Nitrile Rubber. Insulation shown in the tender drawing

ACOUSTIC LINING OF DUCT

The material to be used for duct lining shall be 12 / 25mm thick resin bonded fibre glass rigid board having a density of 32 Kg/m^3 & covered with 0.5 mm thick perforated aluminum sheet. The lining of initial length of the duct shall be done as shown in the tender layout drawings & shall be carried out as follows.

a) Clean the duct piece thoroughly,

b) Fix the board of suitable thickness inside the duct & cover with fibre glass tissue paper.

c) Cover the insulation board with 0.5mm thick perforated aluminium sheet with at least 20% perforation.

d) Secure the insulation board & aluminium sheet with cadmium coated bolts nuts & cup Washers / steel screws. Finally seal the ends completely, so that no lining material is exposed.

REFRIGERANT PIPE INSULATION

The whole of the liquid and suction refrigerant lines including all fittings, valves and strainer bodies, etc. shall be insulated with 19mm /13 mm thick Nitrile Close cell rubber as specified in Detailed Bill Of quantities.

DRAIN PIPE INSULATION

Drain pipes carrying condensate water shall be insulated with 6 mm thick Nitrile rubber.

STANDARD SPECIFICATION FOR AIR CIRCULATION SYSTEM

This section deals with supply, erection, testing & balancing of GI sheet metal duct work and air registers conforming to specifications as given below:

MATERIAL FOR DUCTING

The duct shall be fabricated out of galvanised sheet, class VIII (Zinc coating 120 gm/m^2 as per the parameters given below which are conforming to IS 655-1963.

Maximum Side(mm)	Thickness of Sheet (mm)	Type for Transverse Joint Connections	Bracing	Duct Supports with 10mm dia. M.S. bar
Up to 300	0.63	G.I Flange joints.	None	25 x 25 x 3 mm angles, spacing 2m.
301 to 600 601 to 750	0.63	G.I. Flange joint	None 25 x 25 x3 mm angles, 1.2 m from joint.	25 x 25 x 3 mm angles, spacing 2m.
751 to 1000 1001 to 1500	0.80	25x25x3 mm M.S. Flange connections 35 x 35 x 3 mm M.S. Flange connections.	25 x 25 x3 mm angles, 1.2 m from joint. 40 x 40 x3 mm angles, 1.2 m from joint.	40 x 40 x 3 mm angles, spacing 2m.
1501 to 2250	1.00	40 x 40 x 3 mm M.S. Flange connections.	40 x 40 x 3 mm diagonal angles, or 40 x 40 x 3 mm angles, 60 cm from joint.	40 x 40 x 5 mm angles, spacing 2m.
2251 and above	1.25	40 x 40 x 5 mm M.S. Flange connections..	40 x 40 x 3 mm diagonal angles, or 40 x 40 x 3 mm angles, 60 cm from joint.	50 x 50 x 6 mm angles, spacing 1.5m.

* Ducts 2250 mm and larger require special field study for hanging and supporting methods.

In addition to above the following points should be also taken into account while fabrication of ducts.

a) All ducts of size larger than 450mm shall be cross broken.

b) All ducts shall be supported from the ceiling / slab by means of MS rods of dia 9mm with MS angle of size 40 x 40 x 5 mm at the bottom with neoprene pad in between the duct & MS angle. The ducts shall be suspended from the ceiling

with the help of dash fasteners. Provision for necessary ancillary materials required for hanging the ducts shall be arranged by the contractor.

c) The vanes shall be provided wherever required and shall be securely fastened to prevent noise & vibration.

d) The rubber gasket shall be installed between duct flanges in all connections and joints.

e) All flanges and supports should be primer coated.

f) The flexible joints shall be fitted to the delivery side of AHU fans with Fire Retardant Double canvass. The length of flexible joints should not be less than 150 mm and not more than 300 mm between faces.

g) The ducting work can be modified if deemed necessary in consultation with the Engineer in Charge to suit actual site conditions in the building.

NOTE: In case angle iron supports are not feasible to be installed for supporting the ducts due to height constraint then the contractor shall support the ducts with M.S flats of at least double the thickness of the angle iron supports.

FRESH AIR INTAKE LOUVERS WITH BIRD SCREEN

The fresh air intake louvers at least 50mm deep will be made of powder coated extruded aluminum construction. Bird / insect screen will be provided with the intake louvers. The blades shall be inclined at 45 degree on a 40mm blade pitch to minimize water ingress. The lowest blade of the assembly shall be extended out slightly to facilitate disposal of rain water without falling on door / wall on which it is mounted.

The intake louvers shall be provided with factory fitted aluminum construction volume control dampers in black anodized finish.

PAINTING

All ducts collar / shoot behind the grills / diffuser shall be given at least two coats oil black enamel paints.

TESTING
The complete duct system shall be tested for air leakage & complete air distribution system shall be balanced in accordance with air quantities indicated on the approved drawing.

STANDARD SPECIFICATION ON REFRIGERANT PIPING WORK
This section deals with supply, installation, testing & commissioning of refrigerant piping as detailed below in specifications.

REFRIGERANT PIPING

All refrigerant piping for the air conditioning system shall be constructed from soft seamless up to 19.1mm and hard drawn copper refrigerant pipes for above 19.1mm with copper fittings and silver-soldered joints. The refrigerant piping arrangements shall be in accordance with good practice within the air conditioning industry, and are to include charging connections, suction line insulation and all other items normally forming part of proper refrigerant circuits.

All joints in copper piping shall be sweat joints using low temperature brazing and or silver solder. Before jointing any copper pipe or fittings, its interiors shall be thoroughly cleaned by passing a clean cloth via wire or cable through its entire length. The piping shall be continuously kept clean of dirt etc. while constructing the joints. Subsequently, it shall be thoroughly blown out using nitrogen.

After the refrigerant piping installation has been completed, the refrigerant piping system shall be pressure tested using nitrogen at pressure of 20Kg per sq. cm and 10 Kg per sq. cm (low side). Pressure shall be maintained in the system for 24 hours. The system shall then be evacuated to minimum vacuum if 700mm hg and held for 24 hours.

The air-conditioning system supplier shall be design sizes and erect proper interconnections of the complete refrigerant circuit.

The thickness of copper piping shall not be less than 20gauge for pipes up to 19.1mm and 18 gauges for bigger sizes

The suction line pipe size and the liquid line pipe size shall be selected according to the manufacturers specified outside diameter. All refrigerant pipes shall be properly supported and anchored to the building structure using steel hangers, anchors, brackets and supports which shall be fixed to the building structure by means of inserts or expansion shields of adequate size and number to support the load imposed thereon.

The OD wall thicknesses & wall thickness size of Copper refrigerant piping shall be as follows:

Sl. No.	Outside Diameter (mm)	Wall Thickness (G)
a)	41.3	18
b)	34.9	18
c)	19.1	20
d)	15.9	20
e)	12.7	20
f)	9.5	20
g)	6.4	20

DESIGN SUMMARY															
S. N.	Floor	Room	Area (in sqft)	Ref.Load (in TR)	Dehumidified CFM	Type of Unit	IDU (TR)	CFM	Qty	Total IDU (TR)	ODU for Heating / Cooling	Fresh Air CFM	Type of Fresh Air Unit	Capacity of Fresh Air Unit	Qty
1	Third	Fresh Water Lab	796	7.82	2750	High Static	8.01	2684	1	8.01	20 HP X 3 Nos.	425	HRV Unit 1	1500 CMH	1
2		Sample Store & Prep Analysis	346	5.28	1798	High Static	6.33	2260	1	6.33		300			
3		Soil & Solid Waste	229	1.46	620	High Static	2.33	915	1	2.33		39			
4		Head Water Lab	185	1.23	528	Cassette	1.59	569	1	1.59		31			
5		Head IFD	279	1.80	747	Cassette	2.33	781	1	2.33		52			
6		Junior Staff 1	178	1.34	546	Cassette	1.59	569	1	1.59		41			
7		Scientist	103	0.88	375	Cassette	1.03	464	1	1.03		21			
8		Waste Water Lab	760	9.02	2738	High Static	8.01	2684	1	8.01		600	HRV Unit 2	1500 CMH	1
9		Sample Storage	73	2.41	527	Cassette	3.02	1013	1	3.02		200			
10		Instrumentation Room	218	2.61	1085	Cassette	3.50	1189	1	3.50		80			
11		Support Staff for Director	296	2.49	1055	Cassette	3.50	1189	1	3.50		80			
12		Junior Staff 2	178	1.34	546	Cassette	1.59	569	1	1.59		41			
13		Sample Storage + Instrumentation Area	291	3.79	1674	High Static	6.33	2260	1	6.33		100	with HRV Unit 1	with HRV Unit 1	
14		Scientist 2	484	2.34	901	High Static	2.33	915	1	2.33		120			
15		Committee Room	195	2.69	989	Cassette	3.02	1013	1	3.02		50			

SECTION- 1

SCOPE OF WORK

The Contract shall consist of the complete supply installation, setting to work, testing and one year maintenance of the air-conditioning and ventilation systems as indicated on the drawings.
All services must be fully co-ordinated by the Contractor to provide a complete, working installation.
The Contractor shall furnish all labour, materials, equipment, tools, appurtenances, services, temporary work and storage necessary to install the systems in perfect working order in accordance with the specification and drawings.
The work shall include but may not be limited to:
Ductwork for all systems requiring same including all casings, dampers, grilles, registers diffusers fixtures and fittings.

1) Ductwork for all systems requiring same including all casings, dampers, grilles, registers diffusers fixtures and fittings.
2) Thermal insulation for all ductwork (wherever applicable for ventilations ducts) and acoustic insulation for ductwork as indicated on the drawings or as necessary to maintain the desired noise levels within the building.
3) Thermal insulation to all refrigerant pipe work including all valves, fixtures and fittings as specified.
4) Controls and control wiring for all systems including all electric and thermostatic elements.
5) Testing and commissioning of all systems to demonstrate the entire installation is in perfect working order.
6) Electrical work including the motor control center and the wiring of all specified equipment from the nearest source of electrical current
8) All builders work drawings as required.

All equipment shall be brand new bearing stamped ratings as required and must be approved by the Engineer and endorsed by the Architect prior to their use.

All steel work in connection with supports for equipment ductwork, pipe work, etc. shall be painted with two coats of an approved rust preventative paint.

Internal surfaces of grilles, diffusers ducts, etc. visible to occupants shall be painted with two coats of a suitable mat black or other color as directed by the Engineer.

The Contractor, in quoting for equipment or apparatus whether specified by name or whether of a make selected by the Contractor, shall be deemed to guarantee its satisfactory performance under all working conditions.

Extent of Contract

The work under this section of the specification shall include for the supply, delivery to site, installation, testing and

commissioning and setting to work the new Air conditioning and Ventilation systems for the proposed Communications

Complex.

- All air conditioning and ventilation system complete with all accessories and controls, as per specifications, schedules and drawings;
- Complete air distribution system, return air collecting system, fresh air and ventilation system as shown on the drawings and as specified; and
- Various controls, instruments and their connections, electrical works related to air conditioning and ventilation systems as detailed in the specifications.

The Contractor shall provide all the materials, labour, cartage, plant and appliances necessary for the supply, installation,

testing and commissioning of the work and all other minor and incidental works necessary for the system.

The specifications and drawings are intended to indicate the nature and scope of the project. The Contractor shall be responsible for the installation of plant of the correct capacity and shall guarantee the efficient performance of the equipment.

Exclusions Items necessary for the completion of the plant but not included in the tender are to be listed as exclusions. It will be assumed that The Contractor will provide any items or services necessary to the air conditioning plant and not specifically excluded even if not mentioned in the tender.

SECTION 2

GENERAL REQUIREMENT

Quality of Equipment and Materials

All equipment and materials shall be brand new, of a quality accepted by The Engineer and presenting no dent, damage or breakage during transportation or installation. All metal parts shall be protected on site from rust, corrosion and dirt by properly storing, packing and covering. All rusted parts of metal, subject to The Engineer's approval shall be cleaned of corrosion products and given two coats of anti-rust paint before installation.

Instructions for Operation and Routine Maintenance

The Contractor shall provide written instructions in English languages as to the method of operation of equipment and the routine maintenance works (cleaning of air filters etc.). Six copies of such instructions shall be handed over to The Engineer.

Painting, Tags, Nameplates

All steel works in connection with supports for pipes, cable trays etc., exposed to the elements are to be painted with two coats of an approved rust preventive paint, preferably zinc rich primer and two coats of enamel paint of grey colour or as approved by The Engineer.

All exposed metal surfaces of refrigeration and electrical apparatus, motors, guards, insulated pipe work etc., must be painted with one coat of under-coat and two coats of enamel paint finish to approved colour. Identification bands, colour codes (refer BS 1710 : 1975) and directional flow arrows shall be painted on piping or insulation at frequent intervals indicating the unit services and the fluid conveyed. Lettering shall be in English.

Identification of ductwork, colour codes, directional flow arrows and application of symbols shall be carried out in accordance with SMACNA. Internal surfaces of ducts at the grille or diffuser terminals and connections visible to occupants in rooms shall be painted with two coats of dull black paint.

All power supply switches shall be tagged identifying the area served, the capacity of switching and equipment they feed. Same identification must appear on the wiring diagram submitted with the operating instructions. All wires shall bear identification numbered tags corresponding to the same wiring diagram mentioned above.

TEST AT SITE

General

The Contractor shall submit to The Engineer, one month prior to the date of commencement of the tests, six (6) copies of the complete test procedures to be used. The procedure, method of calculation etc., shall be approved by The Engineer before any test is carried out. Six (6) copies of the test results shall be furnished to The Engineer for his approval.

The Contractor shall supply skilled staff and all necessary instruments and carry out tests of any kind on a piece of equipment, apparatus, part of system or a complete system if The Consultant requests such a test, for determining specified or guaranteed data as given in the specifications or in the schedule of equipment filled in by The Contractor.

Any damage resulting from the tests shall be repaired and/or damaged material replaced, all to the satisfaction of The Engineer. In the event of any repair or adjustment required to be made, other than the normal running adjustment, the tests shall be void and shall be recommended after the adjustments or repairs have been completed. The tests shall not be void due to circumstances beyond The Contractor's control.

All testing, balancing and final adjustment shall be in accordance with the provision of the applicable 'ASHRAE' standards.

Condensate Piping

Installation of approved Copper piping, sized as per same opening for the Packaged unit drain provision and properly sloped as well as gravity test shall be applied to piping only before connection to equipment. In no case shall, piping, equipment or appliances be subjected to pressure exceeding their rating. If necessary, piping shall be taken down and reassembled and no make-shift method of temporarily repairing leaks etc., will be permitted.

Tests shall be completed and approved before any insulation is applied or pipes and fittings have been concealed. Tests shall be performed in the presence of and to the satisfaction of the Engineer. Any leaks or defects uncovered by the tests shall be repaired and the system retested as above, at no additional cost to The Consultant.

Equipment

All air handling and ventilating equipment, ductwork and air outlets shall be adjusted and balanced to deliver the specified air quantities indicated at each inlet and outlet on The Drawings.

Where the equipment or systems depend upon controls for proper operation, functioning and performance, the latter shall be operated simultaneously with the equipment or system during tests.

If air quantities cannot be delivered without exceeding the speed range of the sheaves or the available horse-power, The Engineer shall be notified before proceeding with the balancing of air distribution system.

Other tests as specified under the specific equipment headings are to be completed to the satisfaction of The Engineer.

Electrical Equipment

All electrical equipment shall be cleaned and tested on site before application of power as mentioned below:

Wire and cable tests;

Insulation resistance test, phase to phase and phase to earth on all circuits and equipment's using a 1000 volt megger. The insulation resistance shall not be less than 500 meg.ohm;

Earth resistance between conduit system and earth must not exceed three (3) ohms;
Phasing out and phase rotation tests;
Operating tests on all protective relays to prove their correct operation before energizing the main equipment;
Operating tests on all starters, circuit breakers etc; and
Any other test required as per Kahra-maa regulations.

Test on Completion

After finishing the above tests and adjustments, The Contractor shall be responsible for running a reliability trial test for the whole plant installed. The whole of the trial of the plant shall take place during the appropriate seasons when design conditions are met or approximated. The trial shall take place at any reasonable time subject to the approval of The Engineer. The trial shall last for a period of thirty one (31) consecutive days during which time the whole of the plant shall operate continuously without readjustments or repair to the satisfaction of The Engineer.

During the reliability trial test, performance tests shall be conducted on the refrigerating and air conditioning equipment. The test data shall not deviate by more than three percent from the guaranteed capacity data. Temperature readings shall be taken for the entering and leaving air of each air handling unit. Should any part of the apparatus or system fail to meet with the specification requirements, it shall be adjusted, repaired or replaced to the satisfaction of The Engineer. The complete performance test shall then be repeated. The date of commencement of the above said tests shall be subject to agreement with The Engineer. As soon as all tests prescribed in this clause are carried out satisfactorily in the opinion of The Engineer, a formal letter of completion shall be drawn up in three (3) copies and signed by The Engineer.

During the maintenance period, The Contractor shall demonstrate that all equipment and apparatus fulfill the requirements of the specifications and he shall operate all fans, refrigeration and air conditioning equipment for a sufficient time to adjust all dampers, thermostats and controls and shall provide The Engineer with a complete log and report indicating air quantities, fan speed etc., throughout each of the various systems for the operating seasons.

Maintenance Test

During 400 days maintenance period, the operation and day to day routine maintenance of the plant and equipment shall be carried out by the owner's staff whereas the defects / failure in the plant and equipment not as a result of inadequate maintenance, shall be part of The Contractor's responsibility and shall be rectified free of cost by The Contractor. After testing and commissioning, first set of filters for all the Packaged Units shall be provided by The Contractor. During the last month of the Maintenance period, The Contractor shall demonstrate to The Engineer that all equipment and systems are operating according to the capacities and the manner set down in the specifications. On completion of these tests, The Engineer shall issue a formal letter of acceptance for the equipment and system or parts of the system satisfactorily tested and approved.

The Maintenance Certificate will not be issued to the Contractor by The Engineer until all plant has received the above mentioned letter of acceptance and/or unless a bank guarantee is provided by The Contractor for the performance of that part of the plant and equipment not formally tested and accepted.

REFRIGERATION PIPEWORK

Refrigeration piping shall be carried out in seamless, bright, clean refrigeration quality copper tubing and recessed solder joint fittings. Fittings shall be wrought copper or tinned cast brass. Soft annealed tubing shall be used on all pipe sizes below 19mm O.D. whilst hard drawn tubing shall be utilised on all larger sizes. All pipe cuts shall be neatly reamered and cleaned prior to making joints. Silver solder shall be used and tubing shall be protected against oxidation during silver soldering by use of dry nitrogen flowing through the tubing.

Liquid refrigerant lines shall incorporate the following components:-

Bypass flow replaceable type filter driers, of angle type and rated for the full refrigeration duty of the system.

Y - type full flow strainers.

Isolating valves of the diaphragm type.

Moisture indicating type liquid sight glasses.

Angle type, backseating, capped liquid charging valves with flare charging connections fitted with flare-fitting cap nuts.

Liquid line solenoid valves.

Thermostatic expansions valves of the external Equaliser type.

Suction lines shall be vapour proof insulated with 25mm thick preformed insulation. The insulation lengths shall be applied to the piping as and when the joints are being soldered in order to reduce the joints in the insulation to a minimum. Once the piping has been tested for leaks the insulation joints shall be glued and taped.

All visible refrigeration piping and/or exposed to the weather shall be housed within galvanized or ultra violet resistant P.V.C. trunking.

Refrigeration pipe work shall be supported at not exceeding 2,4mm centres. Pipes shall be securely clamped to points of support using suitable holderbats. Insulated piping shall have molded cork inserts of 25mm thickness and 50mm width in place of normal insulation where supports occur, vapour proofing at such points being carefully executed. Vibration eliminators shall be installed where indicated on the drawings and the piping shall be supported immediately after such vibration eliminator.

All refrigeration pipe work passing through walls and concrete floor slabs shall have P.V.C. sleeves of minimum 3mm thickness for the full depth of the wall and/or floor.

The sensing bulb of the thermostatic expansion valves shall be securely fastened to the suction line using copper strip and brass screws.

Care shall be taken to ensure that pipework is neatly run in straight lines, this applying especially to soft copper tubing. Pipes shall pitch 25mm in 6m in the direction of flow to ensure oil return.

REFRIGERANT CHARGE

Refrigerant pipework systems shall be charged with refrigerant after evacuation and testing for leaks as outlined below:-

Complete refrigeration circuits shall be tested by means of dry Nitrogen to a pressure of at least 50% above working pressure. With the system under the pressure of the Nitrogen, brush all possible points of leakage with a solution of soap and water to which a few drops of Glycerine have been added. All soldered joints shall be tapped with a hammer to break possible flux seals. Any leaks which may be found by bubbling of the soapy water should be made good after the Nitrogen has first been released. When a leaking joint is detected, the fitting shall be taken out, cleaned and re-soldered into the pipe work again.

Systems should next be charged with Refrigerant to a minimum pressure of 200 kPa and then brought to a pressure of at least 50% above working pressure with dry Nitrogen. A "HALIDE" or Electronic leak detector shall at this stage be used to detect any further leaks.

Systems found to be free of leaks shall be allowed to remain under pressure for a 24 hour period. If no pressure drop is observed after this period, taking into account ambient air temperatures, the Nitrogen mixture shall be discharged to atmosphere.

The system shall then be evacuated by means of a suitable vacuum pump to a vacuum of 2,5mm of Mercury, allowed to stand for 12 hours and, if no pressure rise has occurred , shall be charged with refrigerant via the charging valve.

CONTRACT DRAWINGS

The drawings for services works are performance drawings, diagrammatic, and intended to convey the scope of work and indicate general arrangement and approximate locations of apparatus, fixtures, pipe and duct runs, etc.. The drawings do not intend to indicate architectural or structural details, nor do they show any fabrication or installation details.

Do not scale drawings. Obtain accurate dimensions to structure and architectural items from drawings of those trades. Confirm by site measurement. Verify location and elevation of all services (Water, Electrical, Telephone, Sanitary, Storm Drainage, Gas etc.) before proceeding with the work.
Make at no extra cost, any changes or additions to materials, and/or equipment necessary to accommodate structural conditions (pipes or ducts around beams, columns etc.).
Alter, at no additional cost, the location of materials and /or equipment as directed, provided that the changes are made before installation and do not necessitate additional material.
Install all ceiling mounted components (Diffusers grilles, detectors, light fixtures, emergency lights, fire detectors, loudspeakers, camera points etc.) in accordance with the reflected ceiling drawings, which are to be prepared by the Contractor and co-ordinated with all trades. These must be submitted for approval and be approved before any work commences on site.
Leave space clear and install all work to accommodate future materials and/or equipment as indicated and/or supplied by another division of work of the contract. Install all pipe runs, conduit runs, cable trays, etc., to maintain maximum headroom and clearances, and to conserve space in shafts and ceiling spaces and under floors, and to provide adequate space for service and maintenance.
Confirm on the site the exact location of outlets and fixtures. Confirm also location of outlets and fixtures provided by any other division of work under the contract.

CONSTRUCTION DRAWINGS

Prepare drawings in conjunction with all trades concerned, showing sleeves and openings for all passages through structure and all insert sizes and locations.
Prepare composite construction drawings, fully dimensioned, of piping and equipment in tunnels, shafts, mechanical equipment rooms and areas, and all other critical locations to avoid a conflict of trades.
Base equipment drawings upon shop drawings and include but do not necessarily limit to, all details pertaining to access, cleanouts, tappings, sleeves, electrical connections, drains, location and elevation of pipes, ducts, conduits, etc., obtained from consultation with, and agreement of, all trades involved.
Prepare drawings of equipment bases, pump pits, anchors, inertia slabs, floor and roof curbs, wall openings, trenches, pertaining to mechanical work.
Prepare all drawings to scales and dimension. Forward these drawings, approved by all trades concerned to the Consultant for his records. Provide transparencies and provide printed copies in a number as specified elsewhere in the Contract but not less than four sets.
Bind one complete set of construction drawings showing “as built” conditions in each operating and maintenance instruction manual. The extent of these drawings will be indicated to the Contractor in advance by the Consultant.

SHOP DRAWINGS

Submit shop drawings and samples for materials and equipment as listed in this and in each subsequent section.
Provide transparencies wherever possible and provide printed copies in a number as specified elsewhere in the contract documents. The Consultant may retain the sample of each item at his/her discretion until the completion of the contract.
Present a schedule of shop drawings after award of the contract and not later than what is specified in the contract documents, indicating the anticipated date when the drawings will be submitted for review. Assume full responsibility for timely submission of all drawings. Allow a minimum of three weeks for the Consultant’s review. At time of submission indicate order deadlines and cost implications, etc., otherwise the Consultant will advise the Owner that cost and completion date will be unaffected.
Drawings production and presentation is a contractual matter and any delay on the MEP Package Contractor’s behalf in making these submissions will be considered a Contractual delay and may be subject to Contractual penalties and other remedies as determined by the Consultant.
The Consultant will only consider shop drawings bearing the stamp of the MEP Package Contractor. Check for all pertinent information such as physical dimensions, make, performance, electrical characteristics and indicate the intended use and location before submitting these drawings. Use reference symbols or enumeration to correspond to the design drawings.
Assume responsibility for accuracy of equipment dimensions related to space available, accessibility for maintenance and service, compliance with inspection
authorities codes. Ensure that shop drawings indicate the shipping and working weights of all equipment.
The submission of samples will be subject to the same procedure as that of shop drawings.

The Consultant will mark the drawings “resubmit specified item”, “rejected”, “no exception taken”, or “make correction noted”. In the last case all revisions will be clearly marked on the returned print and corrected prints may be issued for manufacture and construction.
Make the revisions shown on the “make corrections as noted” prints onto the tracings as soon as practicable and forward copies to the Consultant for his records. The time allocation for this shall be within two weeks. Failure to resubmit in this time frame will cause the drawings to be treated as “revise and resubmit” and the MEP Package Contractor will be responsible for any delays so caused.
Make the changes on the “revise and resubmit” drawings onto the tracings and resubmit within two weeks.
The Consultant is not responsible for any delays caused by the inadequacy of the MEP Package Contractor’s drawings or his failure to obtain initial or subsequent approval. Any time taken by the MEP Package Contractor to obtain approval after the originally scheduled date will be considered as a delay to the contract caused by the MEP Package Contractor.
When drawings are marked “resubmit specified item”, the MEP Package Contractor is to resubmit the item as originally specified or as may be determined to be equivalent by the Consultant. The Consultant is the sole arbiter of whether any item is satisfactory or equivalent.
When drawings are marked “rejected” a complete resubmission of the particular drawing is necessary, subject to the same conditions as outlined above.
The Consultant’s review shall not relieve the MEP Package Contractor from responsibility for deviations for the Consultant’s drawings and specifications, unless he has, in writing, called the Consultant’s attention to such deviations at the time of submission of drawings. The Consultant’s review shall be construed to apply to, and only to, general arrangements and shall not relieve the Contractor from the entire responsibility. Any approval by the Consultant shall be on the understanding that any item submitted shall be ordered with options and modifications to fully meet the specification. Any fabrication, erection, setting out or other work done in advance of receipt of stamped drawings shall be done entirely at the MEP Package Contractor’s risk and cost.
Furnish prints of the reviewed details to all other parties who may require them for proper coordination of their work, and furnish all information necessary for the work as a whole.
Obtain Manufacturers’ installation directions to aid in the proper execution of the work. Submit two copies of such directions to the Consultant prior to installation, for use in inspecting the work.
Bind one complete set of checked shop drawings into each operating and maintenance manual.
Shop drawings and samples shall be submitted in batches as indicated in the documents, but at not more than four (4) separate times. Liquidated damages will be deducted from the Contractor for each additional submission which is or becomes necessary, unless such is a result of a design change or similar Consultant’s instruction. The amount of deduction for each such liquidated damage occurrence shall be decided by the Consultant and shall be deducted from any payments or amounts due to the Services Contractor and shall be paid by the General Contractor direct to the Consultant upon receipt of his payment.

MANUALS

The Contractor shall make provision for the supply of three (3) copies of the Instruction Manual before issue of Practical

Completion Certificate. This manual shall include the following items:

- Complete list of all items of equipment, controls and accessories as actually supplied including serial nos. and all name plate details”
- A set of 'As-built' drawings showing equipment layout foundation details, ducting layout and details, electrical wiring and drain piping. The Drawings shall show plans and sections necessary to show all required information correctly;
- A set of manufacturer's catalogues, wiring diagram and installation drawings relevant only to the particular item of air conditioning and ventilation equipment concerned. General catalogues will not be acceptable;
- Manufacturer's printed spare parts list for all items of equipment;
- Operational description of the air conditioning plant including starting, stopping and seasonal shut-down;
- Preventive maintenance routine at weekly, monthly and yearly intervals and maintenance procedures for all plant and equipment;
- Manufacturer's full name and address together with telephone, fax numbers; and
- Name, address, telephone and fax numbers of local agents / suppliers.

TEST HOLES

The test holes shall be provided in the horizontal side of the duct and shall be of 22 mm diameter fitted with an effective removable seal. The test holes shall be located at the following locations:

- At fans (in the straight section of duct near to fan outlet);
- At cooling coils;
- At main branches after regulating dampers;
- At any other position as per Engineer's requirements; and
- Location of test holes shall be marked on the duct surface or on the insulation.

SECTION – 6

Technical data sheet

Sl. No.	Description	Unit	Tenderer Confirmation
1.	Variable Refrigerant Volume Aircooled units		
1.1	Outdoor units (Heat Pump Type)		
1.1.1	Make and model	:	
1.1.2	HP of Outdoor Unit (ODU)	:	
1.1.3	Capacity (each) TR (Nominal)	:	
1.1.4	Quantity (nos.)	:	
1.1.5	Type	:	
1.1.6	Permissible length of Refrigerant piping from ODU to farthest IDU.	:	
1.1.7	Type of compressor	:	
1.1.8	No. of compressor (each outdoor unit)	:	
1.1.9	No. of inverter compressor (each Outdoor unit)	:	
1.1.10	Air entering temp. On Condenser (Deg C)	:	
1.1.11	Dimension of Machine (H x W x D-mm)	:	
1.1.12	Are bigger machines (Above 18 HP) provided With 2 separate inverter compressors for proper duty cycling and higher reliability.	:	
1.1.13	Confirm if dedicated Intelligent touch controller(with touch screen functions) with colored graphic LED display provided to act as BMS for VRV system.	:	
1.1.14	Confirm if inverter scroll compressor is DC inverter	:	
1.1.15	External static pressure available in ODU	:	
1.1.16	Is anticorrosion (PE) treatment available on fins of outdoor unit	:	
1.1.17	Type of Heat exchanger in outdoor machine (Optimized E pass or some other type)	:	
1.1.18	Set up available for Night time quiet operation	:	
1.1.19	Confirm feature available for reduction of fan noise and pressure loss on outdoor unit	:	

1.1.20 Is it possible to have automatic address setting of each indoor on Outdoor unit? Otherwise what alternate function available? :

S.No.	Description	Unit		Condition of Services
1.2	Indoor Units		1	2 3 (Give detail for each type)
1.2.1	Manufacturer	--		
1.2.1.1	Type	--		
1.2.1.1	Capacity	--		Tons
1.2.1.3	Airflow Min/Max.	--		Cfm
1.2.2	Sound level	--		Hi/Lo
1.2.3	Overall Dimensions	--		l x w x h
1.2.4	Unit weight KG	--		kg
1.2.5	Is remote controller (corded) provided for each indoor unit	-		Yes/No.

SECTION – 7

1. DESIRED MAKE OF MATERIALS ACMV SYSTEM

S.N	Description	Manufacturer
1.	VRF SYSTEM	LG Electronics, O- General, Dakin, Voltas, Blue Star, Hitachi and Toshiba
2.	Air-cooled SPLIT Units	LG Electronics, O- General, Dakin, Voltas, Blue Star, Hitachi and Toshiba.
3.	COLD ROOM	RINAC / Blue star
4.	Blower / Fans	KRUGER / SYSTEM AIR/Nicotra/Airflow/Humidin
5.	GI Sheets	Sail / Jindal/Tata
6.	Grilles and Diffusers	AJANTA / Air Master/Airflow
7.	Volume Control Dampers	AJANT / AIR MASTER/Airflow
8.	Fire – Dampers /dampers	Caryaire / Air master/Airflow
9.	Actuator	Belimo / Siemens
10.	Fresh air / Exhaust air Louver	AJANT / AIR MASTER/Airflow
11.	Flexible hood pipe-Robo arm type	Nutech / Alsident
12.	Thermal / Acoustic insulations	Thermobreak / K-flex/AFLEX
13.	Condensate drain pipes	Finolex / supreme / PRINCE

NOTE:
Contractors intending to supply other makes of materials / equipments than those listed above, shall indicate the makes in their offer. Contractors shall clearly indicate the make of equipments considered by them for that particular project in their tender / offer

2. DESIRED MAKES OF MATERIALS (AC associated Electrical work)

S.N.	Description	Manufacturer
1	M C C B	: ABB / MERLIN GERIN / SIEMENS
2	M C B	: SIEMENS / INDOASIAN
3	Push Button & Selector Switch	: SIEMENS / TECHNIK
4	Power Capacitors	: ASIAN / EPCOS / HAVELS
5	Over Load Relays	: SIEMENS
6	3- Phase Energy Meter with MD Indicator	: CIMMCO /CONSERVE
7	P F Meter & Relay	: BELUK / DUCATI
8	Cables	: CCI / GLOSTER
9	Cables Trays	: PROFAB
10	Digital Ammeters & Voltmeters	: CONZERV
12	Contactors	: SIEMENS
13	Indicating Lamps (LED)	: SIEMENS / TEKNIC
14	Connectors	: PHOENIX
15	M C C Fabricators	: ELINS / PRAGATHI / LOTUS POWERGEAR.

Note:
Consultants & Owner will have an option for selecting any one of the make listed above & will inform at the time of ordering.

Contractors intending to supply other makes of materials than those listed above, shall take prior approval of the Consultant's / Client's before ordering on materials

SECTION – 9

LIST OF DRAWINGS

Sl.No.	Drawing No.	Description
1	NT/CPCB/-09 AC-01	Std construction details – 2 no.
2	NT/CPCB/-09 AC-02	3rd floor Water Laboratory A/C system
3	NT/CPCB/-09 AC-03	3rd floor Water Laboratory AC with ventilation system
4	NT/CPCB/-09 AC-04	3rd floor Water Lab refrigerant piping Layout
5	NT/CPCB/-09 AC-05	3rd floor Water Lab ACMV co-ordinated Layout
6	NT/CPCB/-09 AC-10	Terrace layout of 4th Floor Air Lab ACMV equipment Layout

ARTICLES OF AGREEMENT

Made at …….. this …….. day of …….. between…….. ……..(hereinafter referred to as the Employer which expression shall include his, Executors, Administrators and Assigns) of the other part WHEREAS the employer is desirous of "Renovation of Water Lab-SITC of ACMV works" in C.P.C.B building.

WHEREAS the said drawings and the specifications and the priced schedule of quantities have been signed by or on behalf of the parties hereto and WHEREAS the contractor has agreed to execute upon and subject to the conditions at forth herein (hereinafter referred to as 'the said conditions") the work shown upon "the said Drawings" and described in "the said specifications" and the said "

Priced Schedule of Quantities"

At the respective rates mentioned in the priced Schedule of quantities attached.

and WHEREAS the contractor has deposited Rs……. Rupees …… .....……..) with the Employer for the performance of the Agreement.

NOW IT IS HEREBY AGREED AS FOLLOWS:

1. In consideration of the payments to be made to the contractor as hereinafter provided he shall upon and subject to the said conditions execute and complete the works shown upon the said drawings and such further detailed drawings as may be furnished to him by the said Architects and described in the specifications and the said priced schedule of quantities.
2. The employer shall pay the contractor such sums as shall become payable hereunder at the time and in the manner specified in the said conditions.
3. the plans, agreements and documents mentioned above shall form the basis of this contract and the decision of the said Employer as mentioned in the conditions of contract with reference to all matters of dispute as to the material, workmanship or account and as to the intended interpretation of clauses of this agreement or any other document attached hereto shall be final and binding on both parties and shall be made a rule of court.
4. The said contract comprises the above mentioned buildings and all subsidiary works connected there within the same site as may be ordered to be done from time to time by the said Employer even though such works may not be shown on the drawings or described in the said specifications or the priced schedule of quantities.
5. The said conditions and special conditions, specifications, schedule of quantities, wage schedule of labour and schedule of materials to be supplied by the employer and guarantee bond shall be read with construed forming part of this agreement and the parties hereto will respectively abide by and submit themselves to the conditions and stipulation and perform the agreements on their parts respectively in such conditions contained.
6. The Employer reserves to himself the right of altering the drawings and nature of the work and of adding to or omitting any items of work or of having portions of the same carried out departmentally or otherwise and such alternations or variations shall be carried out without prejudice to this contract.
7. All disputes arising out of or in any way connected with this Agreement shall be deemed to have arisen in Delhi and courts in Delhi shall have jurisdiction to determine the same.

8. The several parts of this contract have been read by us and fully understood by us. As witness our hands this …….. …….. day of ……

Signed by the said

_____ _____

in the presence of witnesses EMPLOYER

1. Signed by the said

_____ _____

2. In the presence of

SPECIAL CONDITIONS

1. Sealed tenders superscripted with "Renovation of Water Lab-SITC of ACMV works" should be submitted at the office of the Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi - 110 032. The tender documents will be received upto 3.00 p.m. on 15.03.2012.

2. The bids will be opened on 15.03.2012 at 3.30 p.m. at the same address.

3. No tender will be received after 3.00 p.m. on 15.03.2012 under any circumstances whatsoever.

4. Tender shall remain valid for a period of 3 months from the date of opening the tender.

5. CPCB does not bind itself to accept the lowest or any tender and reserves to itself the right to accept or reject any or all the tenders, either in whole or in part without assigning any reasons for doing so.

6. (a) Each page of tender documents is required to be signed by the person or persons submitting tender in token of his /their having acquainted himself/ themselves with General conditions of contract, General Specification, special conditions, etc., as laid down. Any tender with any of the documents not so signed will be rejected. This also applies in respect of limited and private limited companies.

   (b) the tender submitting on behalf of a firm shall be signed by all the partners of the firm or by a partner who has the necessary authority on behalf of the firm to enter into the proposed contract, otherwise the tender is liable to be rejected.

7. (a) The tender form must be filled in English or Hindi language and all entries must be made by hand written in ink. If any of the documents is missing, or unsigned, the tender will be considered invalid.

   (b) The tender shall also submit along with his tender in respect of items wherein make is not specified a list mentioning the names of manufacturers specialized items which he proposes to use in the work if his tender is accepted.

8. All erasures and alternations made while filling the tender must be attested by initials of the tenderer. Overwriting of figures is not permitted. Failure to comply with either of these conditions will render the tender void. No advice of any change in rate of conditions after opening of the tender will be entertained.

9. Intending tenderers shall pay as Earnest Money a sum of Rs 1,53,255/- by demand draft in favour of CPCB, Delhi.

   A tender which is not accompanied by earnest money will not be considered. The earnest money will be returned without any interest to the tenderer if his tender is not accepted.

10. Within fourteen days of issue of letter of intent from the CPCB of the acceptance of its tender the successful tenderer shall be bound to execute the contract by signing in accordance with the draft agreement and schedule of conditions but written acceptance by the Employer of a tender will constitute a binding contract between the employer and the tenderer whether such formal contract is subsequently entered into or not.

11. All compensation or other sums of money payable by the contractor to the employer under the terms of this contract shall be deducted from its earnest money and the security deposit if the amount to permits and contractor shall unless such deposit has become otherwise payable, within ten days after such deduction make good in cash the amount so deducted.

12. The contractor shall not assign or sublet any portion of the contract. He must not sublet any portion of the contract except with written consent of the Employer, failing which the employer may serve a notice in writing rescinding the contract where upon the security deposit shall stand forfeited at the absolute disposal of the employer.

13. A schedule of probable quantities in respect of such work and specification accompany these special conditions. The schedule of probable quantities are liable to alterations omission, deductions or additions at the discretion of the Employer. Each tender should contain not only the rates but also the value of each item of work entered in a separate column and all the items should be totaled up in order to show the aggregate value of the entire tender. All corrections in the tender rates shall be duly attested by the dated initials of the tenderer. Corrections which are not attested may entail the rejection of the tender. Rates should be quoted both in figures and words in columns specified. In case of discrepancy in the rates in figures and words the rates in words shall be deemed to be correct.

14. The tenderer must obtain for itself on its own responsibility and his own expense all the information which may be necessary for the purpose of making a tender and for entering into a contract and must examine the drawings and must consider and inspect the site of the work and acquaint himself with all local conditions, means of access to the work, nature of the work and all matters pertaining thereto and influencing its rates for the work.

15. The rates quoted in the tender shall include all charges for double scaffoldings, marking out and clearing of site, Airing etc., as mentioned in the specifications. The rates quoted shall be deemed to be for the finished work. Tenderer must include in their rates royalty, sales tax, excise duty, octroi and any other tax and duty, or other levy levied by the central government or any state government or local authority if, applicable, no claim in respect of royalty, sales tax, excise duty, octroi or other tax, duty or levy shall be entertained by the Employer.

16. Time shall be considered as the essence of the contract. The entire work must be completed in 4 (four) calendar months. The attention of the tenderer is drawn to clause 8 of the conditions of contract referring to damage for non-completion. The tenderer shall before commencing work prepare a detailed work programme which shall be approved by the employer.

17. The contractor shall not be entitled to any compensation for any loss suffered by him on account of delay in commencing or executing the work whatever the course of delays may be, including delay arising out of modification of the work entrusted to him or any sub-contracts connected therewith or delays in awarding contracts for other trades of the project or in commencement or completion of such works or in procuring government controlled or other building materials or in obtaining Air and power connections for construction purposes or for any other reason, whatsoever and the employer does not accept liability for any sum besides the tender amount subject only to such variations as may be provided for herein.

18. The successful tenderer is bound to carry out any items of work necessary for the completion of job even though such items are not included in the quantities and rates. Schedule and instructions in respect of such additional items and their quantities will be issued in writing by the Employer.

19. If the Head quarters of the successful tenderers are elsewhere than Delhi he shall have a duly authorized agent in Delhi from the commencement of the work until the building is occupied by the employer. Such agent shall be authorized to act on behalf of the successful tenderer to accept service of notice of contract and to agree to extras, omissions and varied item of work and rates for the same. Such agent shall maintain on his staff a qualified Engineer approved by the Employer and such office personnel as may be required for the efficient execution of works. Any notice under the contract shall be deemed to have been served on the successful tenderer if served upon such agent or sent by registered letter to address. Such agent shall not be changed and shall not leave during the duration of the contract, unless the consent of the Employer shall have been previously obtained. If the Employer shall order the tenderer to carry out any rectifications under the terms of the contract after the building is completed, the successful tenderer shall have the same or another duly authorized agent while such rectifications are being carried out.

20. The successful tenderer must co-operate with the CPCB and its decisions so that the work shall proceed without any delay and to the satisfaction of the employer.

21. The contractor shall be supplied Air and electrical connection free of cost.

22. The security deposit of the successful tenderer will be forfeited if he fails to comply with any of the conditions of the contract.

- On completion of the work, the contractor shall clear away and remove from the site all surplus materials, rubbish and temporary works of every kind and leave the whole of site and permanent works clean and in a workman like condition into the satisfaction of employer.

- The contractor shall also submit the wage schedule for all classes of labourers required in the work, for information of the department and necessary action in case the department desires to engage its labour for minor works to be done departmentally.

S.N.	Classification of Labour	Unit	Rate/day in figures words
1	Diploma holder	Each	
2	Foremen Ist grade	Each	
3	Electrician Ist grade	Each	
4	Fitter Ist grade	Each	
5	Khalasi	Each	
6	Mason	Each	

You have to depute one supervisor not less than diploma holder for supervision of the work and taking necessary direction from the CPCB.

CONDITIONS OF CONTRACT

1. Interpretations

In Construing these conditions, the specifications, the priced schedule of quantities, tender and agreement, the following words shall have the meanings herein assigned to them except where the subject or contact otherwise required:-
"Employer" shall mean ……..
…….. And his (their) heirs, legal representatives, assigns and successors.
" Contractor" shall mean ……..
…….. and his (their) heirs, legal representatives, assigns and successors.

"Site" shall mean the site of the contract works as shown bounded on the site plan attached hereto including any buildings and erections thereon and any other land adjoining thereto (inclusively) as aforesaid allotted by the Employer for the Contractor's use.
"This Contract" shall mean the Articles of Agreement, special conditions, these conditions, the priced schedule of quantities, the specifications, and the appendix and the drawings, additional instructions issued till the receipt of the tender and subsequently correspondence if any till the date of acceptance of tender, and the letter of acceptance of contract.
"Act of Insolvency" shall mean any act of Insolvency as defined by the Presidency town Insolvency Act, or the provincial act or any amending statute.
"Notice in writing" or written notice shall mean a notice typed or printed characters sent (unless delivered) personally or otherwise provide to have been received by registered post to the last known private or business address or registered office of the addressee and shall be deemed to have been received when in the ordinary course of post it would have been delivered.
"Virtual completion" shall mean that building is in the opinion of Employer fit for occupation.
"Words imputing persons" include firms and corporations. Words imputing the singular only also include plural and vice versa where the context so required.

2. Scope of work

The contract in brief covers civil works for the "Renovation of Water Lab-SITC of ACMV works" in CPCB at Parivesh Bhawan, East Arjun Nagar, Delhi – 110 032.
The contractor shall carry out and complete the works in every respect in accordance with this contract and in accordance with the directions and to the satisfaction of the employer. The employer in their absolute discretion from time to time issue further drawings and / or written instructions, details, directions and explanations which are hereafter collectively referred to as the "Employer's Instructions" in regard to:-

a) The variation or modification of the design, quality of works or the additions or omission or substitution of any work.
b) The removal from the site of any materials brought there on by the contractor and the substitution of other materials therefore.
c) The removal and/or re-execution of any works executed by the contractor.
d) The dismissal from the works of any persons thereupon.
e) The opening up for inspection of any work covered up.
f) The amending and making good of any defects under clause (10)

3. Authorities, Notice and Patents

The contractor shall confirm to the provisions of any acts of the legislature relating, to the works and to the regulations and bye-laws of any authority, and of any Air, lighting and other companies and /or authorities with whose system the structure is proposed to be connected, and shall, before making any variations from the drawings or specifications that may be necessitated by so confirming give to the Employer written notice, specifying the variation proposed to be made and the reason for making it, and apply for instructions, thereon. In case the contractor shall not within in seven days receive such instruction he shall proceed with the work confirming with the provisions, regulations or bye-laws in question.
The contractor shall arrange to give all notice; required by the said acts, regulations or bye-laws to be given to any authority, and to pay to such authority, or to any public officer all fees that may be properly chargeable in respect of the works, and lodge the receipts with the employer.
The contractor shall identify the Employer against all claims in respect of patent rights and shall defend all actions arising from such claims unless he has informed the employer before any such infringement received their permission to proceed and shall himself pay all royalties license fees, damages, coasts and charge of all and every sort that may be legally incurred in respect thereof.

4. Access

The employer, their representative shall at all reasonable times have free access to the work and / or to the workshop factories, or other places where materials are being prepared or construct the contract and also to any other place where the materials are lying or from which they are being obtained, and the contractor shall give every facility to Employer and their representative necessary for inspections and examinations and tests of the materials and workmanship. Except the representatives of public authorities no person shall be allowed on the works at any time without the written permission of the employer.
If any work is to be done at the place other than the site of works, the contractor shall obtain the written permission of the employer for doing so. The work during the progress / on completion can also be inspected by the employer.

5. Dismissal of workmen

The contractor shall on the request of the employer immediately dismiss from the works any person employer thereon who may, in the opinion of the employer, be unsuitable or incompetent or who may misconduct himself, and such person shall not be again employed or allowed on the work without the permission of Employer.

6. Date of Commencement and completion

The contractor shall be allowed admittance to the site on the "Date of commencement" stated in the Appendix, and he shall thereupon and forthwith begin the works and shall regularly proceed with and complete the same on or before the "Date of Completion" stated in the Appendix subject nevertheless to provisions for extension of time hereinafter contained.
The time being the essence of contract, the contractor will adhere to time and progress chart and will give proportionate progress in proportionate time i.e. 1/8th of work in 1/4th of the time, 3/8th of the work in ½ of the time and 3/4th of the work in 3/4th of the time and commensurate with the progress as envisaged in the bar chart based on the analogy had accepted by the employer. In case of failure on the part of the contractor to give proportionate progress in proportionate time then the employer may recover by way of liquidated damages the amount calculated as described in the appendix shall however be refunded in case the individual items and the entire works are completed by the target dates, as decided by the employer, whose decision shall be binding.

7. Assignment

The whole of the works included in the contract shall be executed by the contractor and the contractor shall not directly or indirectly transfer, assign or underlet the contract or any part, share interest therein nor shall be take a new partner without the written consent of the employer, and no subletting shall relieve the contractor from the full and entire responsibility of the contractor or from active superintendence of the work during its.

8. Schedule of quantities

The schedule of quantities unless otherwise stated shall be deemed to have been prepared in accordance with the method of measurement mentioned in the specifications and shall be considered to be approximate and no liability shall attach to the employer for any error that may be discovered therein.

9. If in the opinion of the employer the work be delayed

a) By force of nature such as incessant rain, flood, fire and like natural calamities or
b) Reason of any exceptionally inclement of weather or
c) By reason of proceeding taken or threatened by or dispute with adjoining or neighboring owners or public authorities or
d) By the works or delays of other contractor or tradesman engaged by the employer and not referred to in the schedule of quantities and /or specification or
e) By reason of employer's instructions as per clause No.2 or
f) By reason of civil commotion, local combination of workmen or strike of lockout affecting any of the building trades or
g) By consequence of the contractor not having received in due time necessary instructions from the employer for which he shall have specially applied in writing or
h) From other causes which the employer may certify as beyond the control of the contractor or
i) In case of strike or lock out the contractor shall give written notice thereof to the employer, but the contractor shall nevertheless constantly use his endeavors to prevent delay and shall do all that may reasonably be required to the satisfaction of employer to proceed with the work. The employer shall make a fair and reasonable extension of time for the completion of the contractor work.

10. Damage for non-completion

If the contractor fails to complete the work by the date of completion stated in the appendix or within any extended time under clause 9 thereof and the employer certify in writing that in their opinion the same ought reasonably so to have been completed, the contractor shall pay or allow the employer the sum named in the appendix as "liquidated Damaged" for the period during which the said works shall so remain incomplete and the employer may deduct such damage from any moneys due to the contractor.

11. Failure by Contractor to comply with employer's instructions

If contractor after receipt of written notice from the employer requiring compliance, with such further drawings and / or employer's instructions fails within seven days to persons to execute any such work whatsoever may be necessary to give effect thereto and all costs incurred in connection therewith shall be recoverable from the contractor by the employer as a debt or may be deducted by him from any moneys due to the contractor.

12. Certificate and payment

The contractor shall be paid by the employer from time to time by installments under interim certificates to be issued by the employer to the contractor on account of the works carried when in the opinion of the employer work to the approximate value named in the appendix as value of works for interim certificates (less at the reasonable discretion of the employer) has been executed in accordance with this contract, subject however to a retention of the percentage of such value named in appendix hereto as "Retention percentage of interim certificates". The employer may in their discretion include in the interim certificate such amount as per standard CPWD procedure on account of material delivered upon the site by the contractor for use in the works.
And when the works have been virtually completed and the employer shall have certified in writing that they have been so complete the contractor shall be paid by the employer in accordance with the certificate to be issued by the employer the sum of money named in the appendix as 'Installment after virtual completion' and the contractor shall be entitled to the payment of the final balance in accordance with the final certificate to be issued in writing by the employer at the expiration of the period referred to as "Defects Liability period" in the appendix hereto from the date of virtual completion or soon after the expiration of such period as the works shall have been finally completed and all defects made good according to the true intent and meaning hereof whichever shall last happen. Provided always that the issue of the employer of any certificate during the progress of the work set or after their completion shall not relieve the contract or from his liability in case of fraud, dishonesty or fraudulent concealment relating to the works or

materials or to any matter dealt. Within the certificate and in case of all defects and insufficiencies in the works or materials which a reasonable examination would not have disclosed. No certificate of the employer shall of itself be conclusive evidence that any works or materials to which it relates are in accordance with the contract.
The employer shall have power to withhold any certificate if the works or any parts thereof are not being carried out to their satisfaction.
Payments on interim certificate shall be made within the period named in the appendix "Period of honoring Certificate" after such certificate have been delivered to the employer and vetted by the CPCB.

13. Certificate of Virtual completion

The works shall not be considered as completed until the employer have certified in writing that they have been virtually completed and the defects liability period shall commence from the date of such certificate.

14. Employer delay in progress

The employer may delay the progress of the works without vitiating, the contract and grant such extension of time for the completion of contract as they may think proper and sufficient in consequence of such delay, and the contractor shall not make any claim for compensation of damages in relation thereto.

15. Restriction of work to be carried out

if at any time after commencement of the work, the employer shall for any reason what so ever not require the whole work or part thereof as specified in the tender to be carried out, the contractor shall have no claim to any payment of compensation whatsoever on account of any profit / advantage / on which he might have derived from the execution of the work in full but which he did not derive in consequence of the full amount of the work not having been carried out nor shall be have any claim for compensation by reason of any alterations having been made in the original specifications, drawings, designs and instructions which shall involve any curtailment of the work as originally contemplated.
Provided that the contractor shall be paid the charges on the cartage only of materials actually and bonafide brought to the site of work by the contractor and tendered surplus as result of abandonment or curtailment of the work or any portion thereof and then taken back by the contractor, provided however, that the employer shall have in such cases the option of taking over all or any such materials at their purchase price or at local current rates which ever may be less.
In case of such stores having been issued from employer stores and returned by the contractor to employer stores, credit shall be given to the contractor at rates not exceeding those at which they were originally issued to him after taking in to consideration and deduction for claims on account of any deterioration or damage while in custody of the contractor and in this respect the decision of the employer shall be final.

16. Suspension

If the contractor except on account of any legal restraint upon the employer preventing the continuance of work shall suspend the works or in the opinion of the employer shall neglect or fail to proceed with due diligence in the performance of his part of the contract or if he shall more than once make default in respect of clause No.2 the employer shall have the owner to give notice in writing to the contractor requiring that the work be proceeded within reasonable manner and with reasonable dispatch, such notice shall purport to be a notice under this clause. After such notice shall have been given the contractor shall not be at liberty to remove from the site of the work or from any ground contiguous thereto any plant and materials belonging to him which will have been placed there on for the purpose of the works and the employer shall have a lien upon all such plant and materials subsist from the date of such notice being given until the notice shall have been compiled with. If the contractor shall fail for seven days after such notice have been given to proceed with the works as therein prescribed the employer may proceed as provided in clause No.17.

17. Termination of contract by employer

Termination of contractor (being an individual or a firm) commit any "Act of insolvency" or shall be adjudged insolvent, shall make an assignment or composition for the benefit of the greater part in number or amount of his creditors or shall enter into a deed of assignment with his creditors or (being an incorporated company) shall have an order made against him or pass an effective resolution of winding up either compulsorily or subject to the supervision of the court or voluntarily or if the official assignee of the contractor shall repudiate the contractor if the official assignee or the days after notice to him requiring him to do so, to show to the reasonable satisfaction of the employer that he is able to carry out and fulfill the contract and if required by the employer to give security therefore or if the contractor (whether an individual, firm or incorporated company) shall suffer execution to be issued, or if the contractor shall suffer any payment contractor shall assign or sublet the contract, without the consent in writing of the Employer first obtained, or any payments due or which may become due to the contractor there under, of if the employer shall certify in writing that in their opinion the contractor;

a. Has abandoned the contract.
b. Has failed to commence the work, or has without any lawful excuse under these conditions suspended the progress of the work for fourteen days after receiving from the employer written notice to proceed, or
c. Has failed to proceed with the works with such due diligence and failed to make such due progress as would enable the works to be completed within the time agreed upon, or
d. Has failed to remove materials from the site or to pull down and replace works within seven days after receiving from the employer written notice that the said materials or work were condemned and rejected by the employer under these conditions, or
e. Has neglected or failed persistently to observe and perform all or any of the acts, matters or things by this contract to be observed and performed by the contractor to observe perform the same, or

Any other decision, opinion, direction, certificate or valuation of the employer to give any of the same shall be subject to the right of Arbitration and review in the same way in all respects (including the provision as to opening the reference) as if it were a decision of the employer.

18. Deposit

The amount deposited by the contractor along with his tender shall be retained with the employer and it shall be returned to the contractor on the virtual completion of the works. In case of default in any of the foregoing conditions the deposit amount shall be forfeited the employer.

19. The contractor undertakes to ensure due and complete compliance with all laws, regulations, rules etc. whether of the central government or the state government or of any other competent authority applicable to the workmen employed or whose services, are otherwise availed of by the contractor whether in connection with the construction work at the site or otherwise. The employer shall have the right to inspect the records maintained by the contractor concerning such workmen from time to time and contractor shall whenever required by the employer produce such records as the employer's may call upon the contractor produce for the employer inspection in order to ascertain whether or not the requirement of all such laws, regulations, rules etc., have been compiled by the contractor. In the event of any contravention of such laws, regulations, rules etc., coming to light as a result of such inspection or otherwise the employer shall have the right to require the contractor effect such.

20. The employer shall not be responsible if any accident or death is caused during the continuer of work the contractor shall be responsible to pay the compensations.

Settlement of Dispute and Arbitration

I. All disputes and differences arising out of or in connection with the contract and works of any nature assigned under the same (whether during the progress of the works or after their completion), determination, abandonment or breach of the contract shall be referred to a team of three men arbitrator appointed by the Chairman, CPCB. The arbitrators shall elect an umpire among them. In case of conflicting findings by the arbitrators, the decision of the umpire shall be final and binding. It will not be an objection to any such appointment that the arbitrators are the government servants and had any interest in the board or the contract entered into directly or indirectly. In all cases, the arbitrators shall state their decision in writing and if amount of claims in dispute is Rs.50,000/- and above, the arbitrators shall give reasons for award.
Subject as aforesaid the provisions of the arbitrations cancellation act or any statutory modification or re-enactment thereof and the rules made there under and for the time being inforce shall apply to the arbitration proceeding under this clause.

II. It is a term of the contract that the party involving the arbitration shall specify the dispute or dispute to be referred to the arbitrator under this clause together with the amount or amounts claimed in respect of each such dispute.

III. It is also a term of the contract that if the contractor's do not make any demand for arbitration in respect of any claims in writing within 90 days of receiving the intimation from the CPCB that final bill is ready for payment, the claim of the contractor's will be deemed to have been waived and absolutely barred and the board will be discharged and released of all liabilities under the contract in respect of these claims.

IV. The decision of the employer regarding the quantum of reduction as well as justification thereof in respect of rates for sub-standard work which may be decided will be final and would not be open to arbitration. Provided always that no compensation shall be payable for any loss in always that no compensation shall be payable for any loss in consequence of hostilities or war-like operation (a) unless the contractor had taken all such precautions against Air raid as are deemed necessary by A.R.P officers or the Engineers In Charge, (b) for any materials etc., not on the site of work or for any tools and plant, machinery, scaffolding temporary buildings and other things not intended for the work.
In the event of the contractor having to carry out reconstruction as aforesaid, he shall be allowed such extension of time for its completion as is considered reasonable by the employer compliance within such time as the employer may prescribe in that behalf and in the event of the contractor failing to effect such compliance within the time prescribed by the employer then the employer shall without prejudice to his other rights be entitled to withhold from the amount payable to the contractor any amount payable to the workmen under any such laws, regulations or rules and to make payment thereof to the workmen. The employer shall also have in that event the right to terminate the contract with immediate effect and to exercise powers reserved to their employer under the contract as a result of termination.

_____ _____

CPCB CONTRACTOR

Witnesses

1.

2.

PRE-CONTRACT INTEGRITY PACT

General

This pre –bid pre – contract Agreement (hereinafter called the integrity Pact) is made on---------- day of the month of ----------2012, between, on one hand the Member Secretary, represented by I/c, Building, Central Pollution Control Board, Ministry of Environment & Forests, Government of India, hereinafter called the "Buyer" which expression shall mean and include, unless the context otherwise requires, his successors and its assignees) of the first part and M/s _____, represented by, _____ (hereinafter called the Bidder/Seller which expression shall mean and include, unless the context otherwise requires, his successors and its assignees) of the second part.

Whereas the BUYER proposes to procure/work SITC of ACMV and the BIDDER/Seller is willing to offer/has offered the stores/work and

Whereas the Bidder is a private company/public company/partnership/ registered export agency, constituted in accordance with the relevant law in the matter and the Buyer is Member Secretary, Central Pollution Control Board, Ministry of Environment & Forests, Government of India.

NOW, THEREFORE,

To avoid all forms of corruption by following a system that is fair, transparent and free from any influence/unprejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into with a view to:-

Enabling the BUYER to obtain the desired work at a competitive price in conformity with the defined specifications by avoiding the high cost and the distortionary impact of corruption on public procurement, and

Enabling BIDDERS to abstain from bribing or any corrupt practice in order to secure the contract by providing assurance to them that their competitors will also refrain from bribing and other corrupt practices and the Buyer will commit to prevent corruption, in any form, by their officials by following transparent procedures.

The parties hereto hereby agree to enter into this Integrity Pact and agree as follows:-

Commitments of the BUYER

1.1 The BUYER undertakes that no official of the BUYER, connected directly or indirectly with the contract, will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favour or any material or immaterial benefit or any other advantage from the Bidder, either for themselves or for any person, organization or third party related to the contract in exchange for an advantage in the bidding process, bid evaluation, contracting or implementation process related to the Contract.

1.2 The BUYER will, during the pre-contract stage, treat all BIDDERs alike, and will provide to all BIDDERS the same information and will not provide any such information to any particular BIDDER which could afford an advantage to that particular BIDDER in comparison to other BIDDERs

1.3 All the officials of the BUYER will report to the appropriate Government office any attempted or completed breaches of the above commitments as well as any substantial suspicion of such a breach.

2. In case of any such preceding misconduct on the part of such official(s) is reported by the BIDDER to the BUYER with full and verifiable facts and the same is *prima facie* found to be correct by the BUYER, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the BUYER and such a person shall be debarred from further dealings related to the contract process. In such a case while an enquiry is being conducted by the BUYER the proceedings under the contract would not be stalled.

Commitments of BIDDERs

3. The BIDDER commits himself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of his bid or during any pre-contract or post-contract stage in order to secure the contract or in furtherance to secure it and in particular commits himself to the following:-

3.1 The BIDDER will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the BUYER, connected directly or indirectly with the bidding process, or to any person, organization or third party

related to the contract in exchange for any advantage in the bidding, evaluation, contracting and implementation of the Contract.

3.2 The BIDDER further undertakes that he has not given, offered or promised to give, directly or indirectly any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the BUYER or otherwise in procuring the Contract or forbearing to do or having done any act in relation to the obtaining or execution of the Contract or any other Contract with the Government for showing or forbearing to show favour or disfavour to any person in relation to the Contract or any other Contract with the Government.

3.3 The BIDDER shall disclose the name and the address of the agents and representatives and Indian BIDDERS shall disclose their foreign principals or associates.

3.4 The BIDDER shall disclose the payments to be made by them to agents/brokers or any other intermediary, in connection with this bid/contract.

3.5 The BIDDER further confirms and declare to the BUYER that the BIDDER is the original manufacturer/integrator/authorized dealer and has not engaged any individual or firm or company whether Indian or foreign to intercede, facilitate or in any way to recommend to the BUYER or any of its functionaries, whether officially or unofficially to the award of the contract to the BIDDE, nor has any amount been paid , promised or intended to be paid to any such individuals, firms or company in respect of any such intercession, facilitation or recommendation.

3.6 The BIDDER, either while presenting the bid or during pre-contact negotiations or before signing the contract, shall disclose any payments he has made, is committed to or intends to make to officials of the BUYER or their family members, agents, brokers or any other intermediaries in connection with the contract and the details of services agreed upon for such payments.

3.7 The BIDDER will not collude with other parties interested in the contract to impair the transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of the contract.

3.8 The Bidder will not accept any advantage in exchange for any corrupt practice, unfair means and illegal activities.

3.9 The Bidder shall not use improperly, for purposes of competition or personal gain, or pass on to others, any information provided by the Buyer as part of the business relationship, regarding plans, technical proposals and business details, including information contained in any electronic data carrier. The Bidder also undertakes to exercise due and adequate care lest any such information is divulged.

3.10 The Bidder commits to refrain from giving any complaint directly or through any other manner without supporting it with full and verifiable facts.

3.11 The Bidder shall not instigate or cause to instigate any third person to commit any of the actions mentioned above.

3.12 If the BIDDER or any employee of the BIDDER or any person acting on behalf of the BIDDER, either directly or indirectly, is a relative of any of the officers of the BUYER, or alternatively , if any relative of an officers of BUYER has financial interest/stake in the BIDDER's firm, the same shall be disclosed by the BIDDER at the time of filling the tender.

The term relative for this purpose would be defined in Section 6 of Companies Act 1956.

4. <u>Previous Transgression</u>

4.1 The Bidder declares that no previous transgression occurred in the last three years immediately before signing of this Integrity Pact, with any other company in any country in respect of any corrupt practices envisaged hereunder or with any Public Sector Enterprise in India or any Government Department in India, that could justify bidder's exclusion from the tender process.

4.2 If the Bidder makes incorrect statement on this subject, Bidder can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

5. Earnest Money (Security Deposit)

5.1. Every bidder, while submitting commercial bid, shall deposit an amount as specified in the NIT as Earnest Money with the buyer through any of the following instruments:-

(i) Bank Draft or a Pay Order in favour of the CPCB, Delhi,

(ii) A confirmed guarantee by an Indian Nationalized Bank, promising payment of the guaranteed sum to the CPCB, Government of India, on demand within three working days without any demur whatsoever and without seeking any reasons whatsoever. The demand for payment by the Buyer shall be treated as conclusive proof for payment.

(ii) Any other mode or through any other instrument, as stated in tender.

5.2. The Security Deposit shall be valid up to a period of one year or the complete conclusion of contractual obligations to complete satisfaction of both the bidder and the buyer, whichever is later .

5.3 In the case of successful bidder a clause would also be incorporated in the Article pertaining to Performance Bond in the Purchase Contract that the provisions of Sanctions for Violation shall be applicable for forfeiture of Performance Bond in case of a decision by the Buyer to forfeit the same without assigning any reason for imposing sanction for violation of this pact.

5.4 The provisions regarding Sanctions for Violation in Integrity Pact include forfeiture of Performance Bond in case of a decision by the Buyer to forfeit the same without assigning any reason for imposing sanction for violation of Integrity Pact.

5.5 No interest shall be payable by the Buyer to the Bidder(s) on Earnest Money/Security Deposit for the period of its currency.

6. <u>Sanctions for Violation</u>

6.1 Any breach of the aforesaid provisions by the Bidder or any one employed by him or acting on his behalf (whether with or without the knowledge of the Bidder shall entitle the Buyer to take all or any one of the following actions, wherever required:-

(i) To immediately call off the pre-contract negotiations without assigning any reason or giving any compensation to the Bidder. However, the proceedings with the other Bidder(s) would continue.

(ii) The Earnest Money/Security Deposit/Performance Bond shall stand forfeited either fully or partially, as decided by the Buyer and the Buyer shall not be required to assign any reason therefore.

(iii) To immediately cancel the contract, if already signed, without giving any compensation to the Bidder.

(iv) To recover all sums already paid by the Buyer, and in case of an Indian Bidder with interest thereon at 2% higher than the prevailing Prime Lending Rate of State Bank of India , while in case of a Bidder from a country other than India with interest thereon at 2% higher than the LIBOR. If any outstanding payment is due to the BIDDER from the Buyer in connection with any other contract for any other stores, such outstanding payment could also be utilized to recover the aforesaid sum and interest.

(v) To encash the advance bank guarantee and performance bond/warranty bond, if furnished by the Bidder, in order to recover the payments, already made by the Buyer, along with interest.

(vi) To cancel all other contact with the BIDDER. The Bidder shall be liable to pay compensation for any loss or damage to the BUYER resulting from such cancelation/rescission and the BUYER shall be entitled to deduct the amount so payable from the money(s) due to BIDDER.

(vii) To debar the Bidder from entering into any bid from the Government of India for a minimum period of five years, which may be further extended at the discretion of the Buyer.

(viii) To recover all sums paid in violation of this Pact by Bidder(s) to any middleman or agent or broker with a view to securing the contract.

(ix) The Bidder shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any employee of the Buyer, and if he does so, the Buyer shall be entitled forthwith to rescind the contract and all other contracts with the Bidder. The Bidder shall be liable to pay compensation for any loss or damage to the Buyer resulting from such rescission and the Buyer shall be entitled to deduct the amount so payable from the money(s) due to the Bidder.

(xi) In cases where irrevocable Letters of Credit have been received in respect of any contract signed by the Buyer with the Bidder, the same shall not be opened.

(x) Forfeiture of Performance Bond in case of a decision by the BUYER to forfeit the same without assigning ant reason for imposing sanction for violation of this Pact.

6.2 The Buyer will be entitled to take all or any actions mentioned at para 6.1(i) to (x) of this Pact also on the Commission by the BIDDER or any one employed by it or acting on its behalf (whether with or without the knowledge of the BIDDER), or any offence as defined in Chapter IX of the Indian penal Code, 1860 or Prevention of Corruption Act, 1988 or any other statue enacted for prevention of corruption.

6.3 The decision of the Buyer to the effect that a breach of the provisions of this Integrity Pact has been committed by the Bidder shall be final and binding on the Bidder, however, the Bidder can approach the monitor(s) appointed for the purposes of this Pact.

7. Fall Clause

7.1 The Bidder undertakes that he has not supplied/is not supplying the similar systems or subsystems at a price lower than that offered in the present bid in respect of any other Ministry/Department of the Government of India and if it is found at any stage that the similar system or sub-system was supplied by the Bidder to any other Ministry/Department of the Government of India or a PSU at a lower price, then that very price will be applicable to the present case and the difference in the cost would be refunded by the Bidder to the Buyer, if the contract has already been concluded.

8. Independent Monitors

8.1 The Buyer has appoint Independent Monitors (hereinafter referred to as Monitors) for this Pact, in consultation with the Central Vigilance Commission.

8.2 The task of the Monitors shall be reviewed independently and objectively , whether and to what extent the parties comply with the obligations under this Pact.

8.3 The Monitors shall not be subject to instructions by the representatives of the parties and perform their functions neutrally and independently.

8.4 Both the parties accept that the Monitors have the right to access all the documents relating to the project/procurement, including minutes of meetings.

8.5 As soon as the Monitor notices, or believes to notice, a violation of this Pact, he will so inform the authority designated by the BUYER.

8.6 The BIDDER's accept that the Monitors has the right to access without restriction to ala Project documentation of the BUYER including that provided by the BIDDER. The BIDDER will also grant the Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to the sub contractors. The Monitor shall be under contractual obligation to treat the information and documents of all the BIDDER's / subcontractors with confidently.

8.7 The BUYER will provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the parties. The parties will offer to the Monitor the option to participate in such meetings.

8.8 The Monitors will submit a written report to the designated Authority of BUYER within 8 to 10 weeks from the date of reference or intimation to him by the BUYER/BIDDER and, should the occasion arise, submit proposals for correcting problematic situations.

9. Facilitation of Investigation

In case of any allegation of violation of any provisions of this Integrity Pact or payment of commission, the Buyer or its agencies shall be entitled to examine the Books of Accounts of the Bidder and the Bidder shall provide necessary information of the relevant financial documents in English and shall extend all possible help for the purpose of such examination.

10. Law and Place of Jurisdiction

This Pact is subject to Indian Law. The place of performance and jurisdiction is the seat of the Buyer.

11. Other Legal Actions

The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.

12. Validity

12.1 The validity of this Integrity Pact shall be from date of its signing and extend up to 1 years or the complete execution of the contract to the satisfaction of both the Buyer and the Bidder/Seller, including warrantee period whichever is later. In case BIDDER is unsuccessful, this integrity Pact shall expire after six months from the date of the signing of the contract.

12.2 Should one or several provisions of this Pact turn out to be invalid, the remainder of this Pact shall remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

13. The Parties hereby sign this Integrity Pact at _____ on _____ .

BUYER
Member Secretary
Central Pollution control Board
Ministry of Environment and Forests
GOVERNMENT OF INDIA

BIDDER

Witness

1. _____

2. _____

Witness

1. _____

2. _____

APENDIX

1.	Date of Commencement	10th day from the date of issue of letter of award.
2.	Date of completion	4 months from the date of commencement.
3.	Insurance	As directed.
4.	Liquidated damages	1% of the contract value per week subject to a maximum of 10% of the contract value.
5.	Period of final measurements	Within 01 months from the date of completion.
6.	Value of work for Interim Certificate	Running payments of 80% of the work completed not less Rs. 5.0 lacs
7.	Security deposit	10% of the contract amount subject to a maximum upto Rs. 8.00 lakhs. The security deposit will be collected by deductions from the running bills of the contractor at the rate of 10%.
8.	Defects liability period	One year