



IISER Mohali

भारतीय विज्ञान शिक्षा एवं अनुसंधान संस्थान मोहाली

मानव संसाधन एवं विकास मंत्रालय, भारत सरकार द्वारा स्थापित
सैक्टर 81, नॉलेज सिटी, पी. ओ. मनोली, एस. ए. एस. नगर, मोहाली, पंजाब –140306

INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH MOHALI

(Established by Ministry of Human Resource Development, Govt. of India)

Sector-81, Knowledge city, PO-Manauli, SAS Nagar Mohali-140306, Punjab

PAN NO. - AAAAI1781K TAN NO. PTLI10692D

• Phone : +91-172-2240086,2240121 • Fax : +91-172-2240124, 2240266 • <http://www.iisermohali.ac.in> • Email: stores@iisermohali.ac.in

E-mail/CPPP/Institute-Website

IISERM(620)15/16Pur

08th January 2016

TENDER NOTICE

On the behalf of Director, IISER-Mohali, sealed tenders in TWO BID SYSTEM {Technical and Commercial separate } are invited, for purchase of following items along with EMD money by DD /Banker Cheque/FDR/ Bank guarantee for Rs 6,00,000/- and tender fee of Rs 500/- (non-refundable) through DD in favour of the Registrar, IISER Mohali, so as to reach us latest by 29th January 2016 before 1 pm and will be opened on the same day at 4pm.

S. No.	Description	Unit	Qty.
1	<u>Outdoor Unit</u>		
	Variable refrigerant volume modular type air-conditioning system suitable for cooling and heating by using all inverter driven capacity control compressors complete with indoor and outdoor units, COP at 100% should be minimum 3.5 at 35 C (AHRI Conditions) with individual controller, electronic expansion valve and fittings etc. as per quantity given below including full charging of R-410A refrigerant gas(according to piping length) complete i/c powder coating complete as per specifications including lifting positioning, etc at all floors/heights.		
1.1	30 HP (connected to Hi wall units)	Nos.	2
1.2	26 HP (2 connected with Hiwall 2 with AHU)	Nos.	4
1.3	22 HP (connected to AHU)	Nos.	2
1.4	20 HP (Connected to AHU)	Nos.	2
1.5	18 HP (connected to AHU)	Nos.	2
1.6	16 HP (1 connected with Hiwall balance with AHU)	Nos.	5
1.7	12 HP (connected to AHU)	Nos.	2
1.8	10 HP (connected to AHU)	Nos.	6
1.9	8 HP (1 connected with Hiwall)	Nos.	1
1.10	6 HP (connected to Hiwall Units)	Nos.	3

2	<u>Indoor Units (Nominal Capacity)</u>		
2.1	Supply of Hiwall type unit for VRV ODUs above with corded remotes for following capacity with lifting. Positioning, gas charging, etc at all heights		
2.1.1	2.5 HP	Nos	53
2.1.2	2 HP	Nos	20
2.2	Supply of following Double skin Air handling unit with Thermal break.as per the attached specifications & lifting. Positioning, connecting at all floor.		
2.2.1	TYPE A		
a	5000 CFM, 2 x 10 HP coil,125 mm static Backward curved blower	Nos	2
b	5000 CFM, 1 x 16 HP coil, 125 mm static, backward curved blower	Nos	1
c	4000 CFM, 1 x 10 HP coil, 110 mm static, backward curved blower	Nos	4
d	3500 CFM, 1 x 10 HP coil, 110 mm static, backward curved blower	Nos	2
2.2.2	TYPE B		
a	5000 CFM, 16 HP coiling coil+ 16 HP standby cooling coil, Backward curved blower with 125 mm Total pressure.	Nos	1
b	5000 CFM, 18 HP coiling coil+ 18 HP standby cooling coil, Backward curved blower with 125 mm Total pressure.	Nos	1
c	2400 CFM, 6 HP coiling coil, Backward curved blower, 110 mm Total pressure.	Nos	2
d	3500 CFM, 6 HP coiling coil, Backward curved blower, 110 mm Total pressure.	Nos	1
e	3600 CFM, 18 HP coiling coil, Backward curved blower, 110 mm Total pressure.	Nos	1
2.2.3	TYPE C		
a	2000 CFM, 8 HP coiling coil, Backward curved blower, 110 mm Total pressure.	Nos	2
b	2500 CFM, 8 HP coiling coil, Backward curved blower, 110 mm Total pressure.	Nos	2
2.2.4	TYPE D		
2.3.8	1500 CFM, with 6 HP coiling coil, 6 HP standby cooling coil, Backward curved blower with 110mm Total pressure.	Nos	2
2.3.9	1700 CFM, with 6 HP coiling coil, 6 HP standby cooling coil, Backward curved blower with 110mm Total pressure.	Nos	1
3	Supply, assembly erection, Testing and commissioning of AHU VRV kit of following capacity		
3.1	18 HP	Nos	4
3.2	16 HP	Nos	3
3.5	10 HP	nos	8
3.3	8 HP	Nos	4
3.4	6 HP	Nos	12
3.3	8 HP	Nos	4

3.4	6 HP	Nos	12
4	Refrigerant Piping		
	With Following interconnecting pipes one end expanded refrigerant copper pipe work for Variable refrigerant volume units of following outer diameter, insulated with 19/13 mm thick XLPE closed cell electrometric nitrile rubber tubular insulation between each set of indoor & outdoor units with outer mechanical protection of alluminum cladding for all exposed pipes as per specification.		
4.1	41.3 mm dia with 19mm thick nitrile rubber insulation	Mtrs.	10
4.2	34.9 mm dia with 19mm thick nitrile rubber insulation	Mtrs.	70
4.3	28.6 mm dia with 19mm thick nitrile rubber insulation	Mtrs.	440
4.4	19.1 mm dia with 13mm thick nitrile rubber insulation	Mtrs.	460
4.5	15.9 mm dia with 13mm thick nitrile rubber insulation	Mtrs.	500
4.6	12.7 mm dia with 13mm thick nitrile rubber insulation	Mtrs.	440
4.7	9.5 mm dia with 13mm thick nitrile rubber insulation	Mtrs.	810
4.8	6.5 mm dia with 13mm thick nitrile rubber insulation	Mtrs.	320
5	With Following Assembly, Erection, Testing and Commissioning of Imported fittings Y-joints and headers etc.	Nos.	71
6	Drain Piping		
	With Following Rigid PVC Piping complete with fittings, supports as per specifications and duly insulated with 6mm thickness of XLPE closed cell nitrile rubber as per direction of Engineer-in-charge & specifications enclosed as reqd.		
6.1	32 mm dia	Mtrs.	340
6.2	25 mm dia	Mtrs.	570
7	With Following Interconnected control cable between indoor & outdoor diameter 2 Core x .75 sqmm. shielded cable in PVC conduit complete with all respect.	RMT	1000
8	With MS stand to sustain the weight for ODU's including painting complete in all respects	Nos.	29

MAKE:-

1. VRV- DAIKIN / SAMSUNG / MITSUBISHI ELECTRIC / TOSHIBA / LG.
2. AHU- Edgetech/Zeco.
3. PVC Pipe (Heavy Grade): RELIANCE/FINOLEXI ASTRA.
4. Copper piper- TOTALINEIMEHTA TUBES.

Important Note:-

1. Specification enclosed
2. ODUS made in China shall not be acceptable.
3. ODUs made in India are acceptable in case same series of machines have been in production for at least last 3 Years.

4. The bidder has to attach the original letter along with the bid from the manufacturer of VRV Units that the OEM shall support the bidder technically in Design, Installation, and Commissioning and after sales service during warranty.
5. The bidders are advised to carry out the site inspection before giving their bid.
6. Minor opening / finishing of civil works such as holes for piping, cable, cable trays, in slabs and walls is included in the scope.
7. Foundations for all Equipment / Grouting etc. are to be included in the scope.
8. All drawings shall be checked for suitability of space before manufacturing of item by the bidder and shall be approved by the Institute committee.

General Conditions:-

1. Warranty- 1 year.
2. Time of execution 14 weeks including erection & commissioning.
3. The above quantities for piping and cables are likely to increase or decrease, which will be measured as per actual for payments.
4. The agency/bidder must have successfully completed three similar supplies each costing not less than Rs.1.00 Cr. or two similar supplies Rs.1.50 Cr. or One similar supply of Rs.2.00 Cr.
5. The agency/bidder should have average annual financial turn over not less than 2.50 Cr. during last three year ending 31st March 2015.
6. The agency/bidder should not black listed from any Govt./Centre Govt./State Govt./PSU/Institute.
7. Performance guarantees to be taken for at least 5% value of the work.
8. Quotes in 2 envelope system (One Technical with EMD and other Financial) otherwise liable to be rejected.

Instructions

1. The Quotation should be addressed to the Assistant Registrar (S&P), IISER Mohali invariably giving on the envelop Reference No. with date and time of submission of quotation.
2. The quantity mentioned in this inquiry is and shall be deemed to be only approximate and will not in any manner be binding on the Institute.
3. The rates offered should be FOR Chandigarh/Mohali in case of firms situated outside Chandigarh/Mohali, and free delivery at the Institute premises in case of local firms. Supplier outside India please mentions the Ex-works/FOB/FCA/CIF/CIP price clearly.
4. In case of Ex-godown terms the amount of packaging forwarding freight etc should clearly be indicated by percentage or lump sum amount. Institute has policy not to make any advance payment towards any purchase, Letter of credit can be opened if required.

5. THE INSTITUTE IS EXEMPTED FROM EXCISE AND CUSTOM DUTY.
6. SALES TAX :- This Institute is not exempted from the payment of Sales Tax/Service Tax/VAT. The current rate (i.e. percentage of Sales Tax should be clearly indicated included or excluded) wherever chargeable.
7. The delivery period should be specifically stated. Earlier delivery will be preferred
8. The firms are requested to give detailed description and specifications together with the detailed drawings, printed leaflets and literature of the article quoted. The name of the manufactures and country of manufacture should also invariably be stated. In the absence of these particulars, the quotation is liable for rejection.
9. Validity of offer: 90 days. Firm should replace all manufacturing defect parts/ whole item under warranty period without any extra cost including clearance, freight, taxes. Security deposit/ Bank Performance guarantee for 5 % of the value of supply order as per norms shall be sought from firms.
10. Late or delayed quotation will not be accepted.
11. The right to reject all or any of the quotation and to split up the requirements or relax any or all the above conditions without assigning any reason is reserved. For any corrigendum and addendum please regularly visit our website.

AIRCOOLED VARIABLE REFRIGERANT VOLUME / FLOW SYSTEM UNITS

1 SCOPE:

The scope of this section comprises the supply, erection, testing and commissioning of Air cooled Variable refrigerant flow Units, conforming to these Specifications and in accordance with requirement of drawings and of the Schedule of Quantities.

2 TYPE

Units shall be air cooled Heat pump type, variable refrigerant volume / flow air conditioner consisting of outdoor unit and multiple indoor units. Each indoor unit shall have capability to cool or heat. The indoor units on any circuit can be of different type and also controlled individually. Compressor installed in each modular outdoor unit shall be equipped with Scroll / rotary compressors for higher reliability, improved life, better backup and duty cycling purpose. Outdoor unit shall be suitable for mix match connection of all type of indoor units. The refrigerant piping between indoor units and outdoor unit shall be possible to extend up to a minimum of 165m with maximum 50m level difference without any oil traps. Both indoor units and outdoor unit shall be factory assembled, tested and filled with first charge of refrigerant before delivering at site.

3 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.

The outdoor unit shall have multiple scroll / rotary compressors and be able to operate even in case of breakdown of one of compressors. The noise level shall not be more than 68 dB(A) at normal operation measured horizontally 1m away and 1.5m above ground.

The outdoor unit shall be modular in design and shall be allowed for side by side installation.

Each modular outdoor unit shall have multiple inverter Scroll / rotary type compressors. The compressors shall be designed and coordinated to achieve the highest efficiency. The unit shall be provided with its own microprocessor control panel. The outdoor units should have anti-corrosion paint.

The machine must have a sub cool feature to use coil surface more effectively thru proper circuit / bridge so that it prevents the flushing of refrigerant from long piping due to this effect thereby achieving energy savings.

The outdoor unit should be fitted with low noise fan with grill to reduce pressure loss.

The Outdoor machines shall be preferably compact machines for purpose of space saving and smaller foot print shall be preferred.

4 COMPRESSOR

The compressor shall be Scroll / Rotary type and capable of inverter control. The inverter compressor shall change the speed in accordance to the variation in cooling or heating load requirement. The digital compressor shall cater to the variation in cooling or heating load requirement by varying the flow of refrigerant using a pulse modulating valve.

All outdoor units shall have multiple steps of capacity control to meet load variations / fluctuation and indoor unit individual control. All parts of compressor shall be sufficiently lubricated stock. Forced lubrication may also be employed. Oil heater shall be provided in the compressor casing.

5 HEAT EXCHANGER

The heat exchanger shall be constructed with copper tubes mechanically bonded to aluminum fins to form a cross fin coil. The aluminum fins shall be covered by anti-corrosion resin film. The unit shall be provided with necessary number of direct driven low noise level propeller type fans. Each fan shall have a safety guard. The Condenser fins must be coated with Anti-corrosive treatment.

6 REFRIGERANT CIRCUIT

The refrigerant circuit shall include liquid & gas shut-off valves and a solenoid valves and an accumulator is the system demands. All necessary safety devices shall be provided to ensure the safely operation of the system and personnel. Refrigerant should be R410a Only.

7 SAFETY DEVICES

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

High pressure switch, fuse, fan drive overload protector/ fan motor safety thermostat, fusible plug, over load relay, overload protection for inverter / Over Current Relay

8 OIL RECOVERY SYSTEM

Unit shall be equipped with an oil recovery system /oil separator to ensure stable operation with long refrigeration piping lengths. The system must be provided with oil balancing circuit to avoid poor lubrication.

SPECIFICATIONS FOR AIR HANDLING UNITS

1. SCOPE

This section of the specification covers the supply, installation, testing and commissioning of double skin construction air handling units along with its accessories, conforming to these specifications and in accordance with requirement of the 'Schedule of Quantities', Drawings and 'Technical Schedule of Equipment'.

2. CAPACITY

The air handling capacities, maximum motor HP, static pressure shall be as shown on Drawings and as indicated in 'Schedule of Quantities'.

3 HORIZONTAL FLOOR MOUNTED

The Horizontal floor mounted air handling units shall be double skin modular, draw through type comprising of various sections such as mixing chamber (wherever return air and fresh air are ducted.), pre filter section, chilled water coil section, fan section supply air plenum as per details given in Drawings and Schedule of Equipment.

3.1 AHU HOUSING / CASING:

The AHU housing shall be of double skin construction with main structure made of extruded aluminum hollow sections. The panels shall be double skin sandwich type with 0.6 mm pre painted GSS/ pre-plasticised on the outside and 0.6 mm galvanized sheet inside with 25 mm thick PUF insulation material injected in between. These panels shall be screwed with soft rubber gasket fixed in built in groove of aluminum frame in between to make the joints airtight. Framework for each section shall be joined together with soft Neoprene rubber gasket in between to make the joints airtight. Suitable airtight access doors /panels with nylon hinges and locks shall be provided for access to various sections for maintenance. The entire housing shall be mounted on roller-formed GSS channel framework having pressure die cast aluminum jointers.

3.2 Drain Pan

The drain pan shall be of 18 G aluminum/stainless steel with necessary slope to facilitate fast removal of condensate. It shall be provided with drain connection of suitable size complete with 25 mm rigid insulation. Necessary arrangement will be provided to slide the coil in the drain pan. The drain pan shall be insulated with 12 mm thick close cell Nitrile insulation (self adhesive) or equivalent.

3.3 Cooling / Heating Coil

The chilled /hot water coil shall be of seamless copper tubes not less than 27 G thick and 12mm OD. Coil face areas shall be such as to ensure rated capacity from each unit and such that air velocity across each coil shall not exceed 150 meters per minute. The coil shall be pitched in the unit casing for proper drainage. The fins shall be spaced by collars forming integral part of the fins. The tubes shall be staggered in the direction of airflow.

The fins shall be uniformly bonded to the tubes by mechanical expansion of the tube for minimum thermal contact resistance with fins. Fin spacing shall be 11to 13 FPI. The coils shall be tested against leaks at a hydraulic pressure of 21-kg/sq. cm. This pressure shall be maintained for a period of at least 2 hours. No drop should be observed indicating any leaks. The water headers shall be complete with water in /out connections, vent plug on top and drain at bottom and designed to provide water velocity between 2 to 6 FPS.

3.4 Fan Section with Fan

The fan shall be Forward / Backward curved, double inlet double width type. The wheel & housing shall be fabricated from heavy gauge galvanised steel. The fan impeller shall be mounted on a solid shaft supported to housing with angle iron frame & pillow block heavy-duty ball bearings. The fan shall be selected for a speed not exceeding 1000 RPM. The impeller & fan shaft shall be statically and dynamically balanced. The fan outlet velocity shall not be more than 600 MPM. Fan housing with motor shall be mounted on a common extruded aluminum base mounted inside the air handling housing on anti vibration spring mounts or cushy foot mounts of at least 90% vibration isolation efficiency. The fan outlet shall be connected to casing with the help of fire retardant double canvas or Neoprene rubber of imported Origin. The fan shall be selected for a noise level of less than 75 DB (A) at one meter distance.

3.5 Filter Section

Each unit shall be provided with a factory assembled filter section containing synthetic media washable air filters with efficiency of 90% down to 10-micron particle size. Filters shall have aluminum frame. Filter face velocity shall not exceed 150 meters per minute. Filter shall fit so as to prevent by pass. Holding frames shall be provided for installing number of filter cells in banks. These cells shall be held within the frames by sliding the cells between guiding channels.

4. FRESH AIR INTAKES

Extruded aluminum construction duly anodized fresh air louvers with bird screen and extruded construction dampers shall be provided in the clear opening in masonry walls of the air handling unit room having at least one external wall. Fresh air louver, damper, pre filters, ducts and fresh air fan with speed regulator (wherever specified in 'Schedule of Quantities') shall be provided. Fresh air dampers

shall be of the interlocking, opposed blade louver type. Blades shall be free from rattle. Damper shall be similar to those specified in 'air distribution'. Fresh air fans and fresh air intakes shall be as per the requirements of 'Schedule of Quantities'.

5. ACCESSORIES

Each air handling unit shall be provided with manual air vent at highest point in the cooling / heating coil. In addition, the following accessories may be required at air handling units. Their detailed specifications are indicated in individual sections and quantities separately identified (for items a to i) in 'Schedule of Quantities'.

- a. Stem type thermometer at each AHU coil inlet and outlet with tubing and gauge cocks and specification as per the section, 'Automatic Controls and Instruments'
- b. Pressure gauge with globe valves at inlet and outlet of each AHU coil with tubing and specifications as per the section, 'Automatic Control and Instruments'.
- c. Butterfly valves at inlet and outlet of the each coil.
- d. Balancing valve at the outlet of each coil.
- e. Y strainer at inlet of each coil.
- f. Union and condensate drain piping from the unit up to the drain trap as described in section piping.
- g. Motorized two way mixing valves located in chilled /hot water lines connected to the coil. This valve shall be operated by the cooling/heating thermostat and shall control the flow of chilled/hot water as per section 'automatic controls and instruments'.
- h. Cooling /heating thermostat as per section 'Automatic Controls and Instruments' shall be located in return air stream.
- i. Flexible connection between the fan outlet and duct.
- j. Manual Air Vent – 20 mm dia at coil and drain plug at pipe header.
- k. Vibration isolators of at least 90% efficiency.

6 SAFETY FEATURES

Each handling unit must have safety features as under:-

- a. The fan access door must have micro switch interlocked with fan motor to enable switching off the fan motor automatically in the event of door opening. The access door shall further have wire mesh screen as an added feature, bolted on to the unit frame.
- b. Fan and motor base shall be properly earthed from the factory.
- c. All screws used for panel fixing and projecting inside the unit shall be covered with PVC caps to avoid human injury.

7. DRIVE

Fan drive shall be 3phase-squirrel cage totally enclosed fan cooled motor suitable for 415 \pm 10% V, 50 HZ AC supply. Motor shall be specially designed for quiet operation and motor speed shall not exceed 1440 RPM. Drive to fan shall be provided through belt drive arrangement with required no. of belts for power transmission without slippage. Belts shall be of oil resistant type of approved make only.

8 DESIGN DATA FOR AIR HANDLING UNITS

Fan outlet velocity shall not exceed 600 MPM.

The air velocity across coil shall not exceed 150 MPM.

The air velocity across air pre filter shall not exceed 150 MPM.

Motor ratings are only tentative and shall be suitable for the duty but not less than the specified HP. The motor shall be selected with a safety factor of at least 15% over and above the brake power. The AHU fan shall be selected for static pressure as indicated in 'Schedule of Quantities'.

9. INSTALLATION

Air Handling Unit shall be installed to permit the removal of all the parts of AHU for any maintenance work without dismantling other equipment such as plenum, pipes, ducts etc. Air handling unit installation shall be carried out as per manufacturer's recommendation and mounted on serrated rubber pads with proper hanging arrangement. The serrated rubber pads shall be in two layers with 16G GI sheet sandwiched in between.

10. PERFORMANCE DATA

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

11. TESTING

Cooling/Heating capacity of various air-handling unit models shall be computed from the measurements of airflow and dry and wet bulb temperatures of air entering and leaving the coil.

Flow measurements shall be by anemometer and temperature measurements by accurately calibrated mercury in glass thermometer. Computed result shall conform to the specified capacities and quoted ratings. Consumption shall be computed from measurements of incoming voltage and input current.