

DNIT FOR HVAC WORKS AT GHANTAGHAR FAÇADE AT AMRITSAR					
COST OF PROJECT = Rs. 1,55,85,020.00					
S.No.	Description Of Equipments / Materials	Unit	Qty.	Rate	Amount
1)	Variable Refrigerant Volume / Flow Air-conditioning System				
	Supply, Instalaltion, testing and commissioning of Variable Refrigerant Flow modular type airconditioning system with stepless modulation complete with indoor and outdoor units, individual remote controller and centralized controller, interconnected refrigerant piping, full charge of refrigerant gas including additional top up and oil, control cabling etc. as per detail given in specifications and having following items. The prices to be given in Indian rupees including all taxes and duties and delivered at site. Refrigerant to be used shall be - R 410 A only.				
1.1)	Outdoor Unit				
	Supply, Instalaltion, testing and commissioning of modular type outdoor units equipped with highly efficient scroll compressors with all inverter type compressors with minimum COP 4.0 in cooling mode for single module, special heat exchanger, low noise condenser fan, auto check function for connection error, Y joints, auto address setting and capacity as mentioned below. All interconnecting piping, joints and U bends within the condensing unit shall be painted with two coats of clear transparent polymer coating for protection against corrosion from ambient air.				
	a) 10 HP Cool / Heat Pump Unit	NO.	1		0
	b) 14 HP Cool / Heat Pump Unit	NO.	8		0
	c) 22 HP Cool / Heat Pump Unit	NO.	1		0
	d) 42 HP Cool / Heat Pump Unit	NO.	1		0
1.2)	Indoor Units				
	Supply, Instalaltion, testing and commissioning of Indoor units equipped with pre-filter, fan section with suitable static fan to distribute the air as per approved shop drawings, multispeed motor, coil section with DX coil, outer cabinet, drain pan, insulation, pipe connections, GI supports and hanger, fire retardent canvass connection etc. of various capacities as per specifications and drawings.				
	A) Ductable Unit				
	a) 2.6 TR	NO.	2		0
	b) 3.1 TR	NO.	1		0
	c) 4.0 TR	NO.	12		0
	d) 4.6 TR	NO.	3		0

S.No.	Description Of Equipments / Materials	Unit	Qty.	Rate	Amount
1.3)	Y-joints For Indoor Unit				
	Supply, Installation, Testing & Commissioning of Y-joints for Indoor Unit of sizes as required to suit various capacity of Indoor Unit as specified above.	NO.	14		0
1.4)	Self Diagnostic Type Remote Controllers				
	Supply, Installation, Testing & Commissioning of Corded Wall Mounted Type Self Diagnostic Type Digital Programmable Remote Controllers of latest generation for setting required temperature for various Indoor Unit.	NO.	18		0
1.5)	Main Intelligent Programmable Central Controller				
	Supply, Installation, Testing & Commissioning of Main Intelligent Programmable Central Controller of digital type of latest generation suitable for suitable various Indoor / AHU and Outdoor Unit to Operate, Monitor, Programme, On / Off, Temperature Setting etc.	NO.	1		0
1.6)	Expansion Kit, Communication PCB & Thermostat				
	Supply, Installation, Testing & Commissioning of Electronic Type Expansion Kit, Communication PCB with Sensors, Corded Self Diagnostic Type Digital Thermostat etc				
	a) For 4000 CFM F/M AHU with 1x14.0 HP VRV ODU	Set	8		0
2)	Double Skin AHU				
	Supply, installation, testing and commissioning of factory fabricated Double Skinned VRV / VRF DX Air- handling unit floor mounted (horizontal / vertical) or ceiling suspended horizontal type, fabricated out of extruded aluminium section with 0.6mm pre-plasticized / pre-coated Galvanised steel sheet outside & 0.6 mm plain Galvanised steel sheet inside with forward / backward curved blower, blower section and blower motor TEFC type EEF-1 grade suitable for operation on 415 volts \pm 10%, 50 Hz \pm 5% AC supply, 4 / 6 / 8 Row cooling coil made of Aluminium finned Copper tube with coil section of copper header, pre-filter section with non woven synthetic media of 50 mm thick in extruded aluminium frame of 10 micron particle size with an efficiency of 90% of suitable MERV 5 rating, polished stainless steel drain pan made out of 22 G sheet duly insulated complete with motor, belt drive, fire retardent double layer canvass connection etc. without face and bypass dampers.				
	The AHU panels shall be insulated with 23 mm thick for indoor application & 36 Kg/m ³ density PU foam. Relected Motor Kw is for reference only, actual kw to suit requirement shall be included during execution. The motor & blower assembly shall be mounted on Aluminium extruded section only. The complete AHU shall conform to tender specification.				

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	AHU shall be supplied with commissioning filter as specified herein which shall be replaced with actual filters & GI supports and hanger for ceiling suspended AHU. The face velocity across coil & filters shall be limited to 152 MPM maxm. The capacity of Air-handlers shall be as follows.				
i)	4,000 CFM, 50 mm St. Pr., 6 Row CC, 1 x 350 Dia Fan, 2.24 Kw Fan Motor EEF-1 Rating, Pre Filter, Commissioning Filter, C/S Type	NO	8		0
3)	Air Cooled Hi Wall Split Unit				
	Supply, installation, testing and commissioning of air cooled Hi-Wall Split Unit (copper coil with aluminium fins) with rotary compressor suitable for working under 15 to 20 meter length of piping with cordless control of following capacity with eco friendly refrigerant & COP in complinace with GRIHA-III, green building code. All interconnecting piping, joints and U bends within the condensing unit shall be painted with two coats of clear transparent polymer coating for protection against corrosion from ambient air.				
i)	2.0 TR with Rotary Compressor	NO	4		0
4)	Accoustically Insulated Box Type Inline Fans				
	Supply, installation, testing and commissioning of single pahse box type Inline fans with motor, fire retardent double layer canvass connection, GI supports and hanger etc complete in all respect & of following capacities. The casing of inline fans shall be acoustically lined & shall be selected for lower noise level. Fan motor shall have inbuilt speed controller.				
i)	200 CFM (8mm static pressure, single phase)	NO.	1		0
ii)	300 CFM (8mm static pressure, single phase)	NO.	1		0
iii)	500 CFM (15mm static pressure, single phase)	NO.	1		0
iv)	750 CFM (15mm static pressure, single phase)	NO.	1		0
5)	Plastic Propeller Fans				
	Supply, installation, testing and commissioning of propeller exhaust fans of various capacities as given below suitable for 240 volts, 50 Hz, single phase AC supply complete with gravity louvers & speed regulator etc.				
i)	100 CFM, 6 Inch Dia, 3 mm St. Pr.	NO	1		0
ii)	150 CFM, 6 Inch Dia, 3 mm St. Pr.	NO	1		0
iii)	300 CFM, 10 Inch Dia, 3 mm St. Pr.	NO	1		0
iv)	500 CFM, 10 Inch Dia, 3 mm St. Pr.	NO	1		0

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6)	GI Propeller Fans				
	Supply, installation, testing and commissioning of GI propeller exhaust fans of various capacities as given below suitable for 240 volts, 50 Hz, 900 RPM single phase AC supply complete with gravity louvers & speed regulator etc.				
i)	750 CFM, 300 mm Dia, 3 mm St. Pr.	NO	1		0
ii)	1000 CFM, 380 mm Dia, 3 mm St. Pr.	NO	1		0
iii)	1500 CFM, 450 mm Dia, 3 mm St. Pr.	NO	1		0
7)	Refrigerant Piping for VRV / VRF System				
	Supply & fixing of interconnecting copper refrigerant pipe work including the additional amount of refrigerant gas required for charging the system, duly insulated with elastomeric nitrile rubber type tubular insulation of fire retardent grade of conductivity less than 0.22 Btu.in./(h.ft ² °F) and density 50 Kg/CMT with thickness 25 mm up to 51 mm dia pipe and with 32 mm for more than 51 mm dia pipe, between DX AHU / Indoor Unit & outdoor units as per specifications. All piping inside the building shall be properly supported on trays (tray quantified separately) and all external piping shall run in covered tray (tray quantified separately).				
	Indoor & Outdoor insulation shall be mechanically protected with two layers (07 mil thick each layer) of adhesive and Glass Cloth / CSM and Outdoor insulation shall have two coats of special UV resistant paint.				
i)	50.8 mm O.D. (Min. Wall Thickness - 1.64 mm)	RMT	50		0
ii)	44.5 mm O.D. (Min. Wall Thickness - 1.64 mm)	RMT	45		0
iii)	41.3 mm O.D. (Min. Wall Thickness - 1.43 mm)	RMT	65		0
iv)	34.9 mm O.D. (Min. Wall Thickness - 1.21 mm)	RMT	55		0
v)	28.6 mm O.D. (Min. Wall Thickness - 0.99 mm)	RMT	100		0
vi)	22.2 mm O.D. (Min. Wall Thickness - 0.80 mm)	RMT	75		0
vii)	19.1 mm O.D. (Min. Wall Thickness - 0.80 mm)	RMT	125		0
viii)	15.9 mm O.D. (Min. Wall Thickness - 0.80 mm)	RMT	65		0
ix)	12.7 mm O.D. (Min. Wall Thickness - 0.80 mm)	RMT	55		0
x)	9.5 mm O.D. (Min. Wall Thickness - 0.80 mm)	RMT	65		0
xi)	6.4 mm O.D. (Min. Wall Thickness - 0.80 mm)	RMT	55		0

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8)	Refrigerant Piping for Hi Wall Unit				
	Supply, installation, testing and commissioning of refrigerant piping (two lengths) duly insulated with 6 mm kinifoam insulation of density 60+/-10% Kg/m ³ to interconnect indoor & outdoor units for each circuit with GI supports. Indoor & Outdoor insulation shall be mechanically protected with two layers (07 mil thick each layer) of adhesive and Glass Cloth / CSM and Outdoor insulation shall have two coats of special UV resistant paint.				
	a) For Hi Wall Split Unit	RMT	80		0
9)	Supports of Outdoor / Indoor Unit				
	Supply & fixing of GI frames for outdoor units, Choki / Cantilever Type and for indoor unit as required.				
	a) For Hi Wall Split Unit	NO	8		0
	a) For VRV / VRF Unit for each module	NO	14		0
10)	Condensate Drain Piping				
	Supply, installation, testing and commissioning of condensate drain water piping of threaded PPR complete with fittings like elbows, tees, reducers, bends, GI supports etc. as required conforming to tender specifications and of following sizes.				
	a) 25 mm dia pipe	RMT	30		0
	b) 32 mm dia pipe	RMT	25		0
	c) 40 mm dia pipe	RMT	20		0
	d) 50 mm dia pipe	RMT	35		0
	e) 65 mm dia pipe	RMT	25		0
11)	Condensate Drain Pipe Insulation				
	Supply & Insulation of condensate drain water piping with Closed Cell Elastomeric Nitrile Rubber of density 50+/-10 Kg/CMT of specified thickness (19 mm thick up to 50 mm, 25 mm for more than 50 mm) of specified thickness as given in the tender specification and suitable for indoor application and mechanically protected with two layers (07 mil thick each layer) of adhesive and Glass Cloth / CSM.				
	a) 25 mm dia pipe	RMT	30		0
	b) 32 mm dia pipe	RMT	25		0
	c) 40 mm dia pipe	RMT	20		0

S.No.	Description Of Equipments / Materials	Unit	Qty.	Rate	Amount
	d) 50 mm dia pipe	RMT	35		0
	e) 65 mm dia pipe	RMT	25		0
12)	Condensate Drain Piping				
	Supply, installation, testing & commissioning PVC hard drain piping with fittings, insulation etc as required to suit site condition.				
	a) 19 mm Dia. of pipe, PVC Hard Pipe for Hi Wall	RMT	5		0
	b) 25 mm Dia. of pipe, PVC Hard Pipe for Hi Wall	RMT	10		0
	a) 32 mm Dia. of pipe, PVC Hard Pipe for Hi Wall	RMT	5		0
13)	Site Fabricated GI Duct				
	Supply, installation, balancing and commissioning of site fabricated GSS sheet metal rectangular / round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes, GI hangers, GI supports etc. as per approved drawings and specifications of following sheet thickness complete as required.				
	a) 24 G, Thickness 0.63 mm sheet (Up to 750 mm)	SMT	1050		0
	b) 22 G, Thickness 0.80 mm sheet (751 mm to 1500 mm)	SMT	250		0
	c) 20 G, Thickness 1.00 mm sheet (1501 mm to 2250 mm)	SMT	125		0
	d) 18 G, Thickness 1.25 mm sheet (Above 2251 mm & Plenum)	SMT	45		0
14)	Duct Accoustic Lining				
	Supply and fixing of acoustic lining of supply air duct and plenum with 25mm thick resin bonded glass wool having density of 48 kg/m ³ , with 25mmx25 mm GI section of 1.25mm thick, at 600mm centre to centre covered with reinforced plastic tissue paper and 0.5mm thick perforated aluminum sheet fixed to inside surface of ducts with cadmium plated nuts, bolts, stick pins, CPRX compound etc. complete as required and as per specifications.				
	a) 12 mm thick fibre glass rigid board. (For Duct)	SMT	95		0
	b) 25 mm thick fibre glass rigid board. (For Plenum)	SMT	45		0
15)	Internal Duct Thermal Insulation with XLPE				
	Supplying and fixing of following thickness duly laminated aluminum foil of mat finish closed cell polyethylene (class "O") insulation on existing duct after applying two coats of cold setting adhesive (CPRX compound / pidilite SR-998). The joints shall sealed with 50 mm wide and 6 mm thick self adhesive closed cell polyethylene tape insulation complete as per specifications and as required.				
	a) 9 mm thick with aluminium metalized surface	SMT	1275		0

S.No.	Description Of Equipments / Materials	Unit	Qty.	Rate	Amount
	b) 13 mm thick with aluminium metalized surface	SMT	25		0
16)	External Duct Thermal Insulation with Thermocole				
	Supplying and fixing of external thermal insulation on exposed ducts with 50 mm thick expanded polystyrene of density 20 Kg/m ³ duly aluminium claded with 26 G aluminium sheet as per specification given in the tender.	SMT	15		0
17)	a) Fire Dampers				
	Supplying, fixing, testing and commissioning of fire dampers in supply air duct / wall / main branch and return air path as and where required of required sizes i/c control wiring, the damper shall be motorized (actuated with the help of 24 V electric actuator) and spring return so as to close the damper in the event of power failure automatically and open the same in case of power being restored. The spring return action shall be inbuilt mechanism and not externally mounted. The damper shall also be closed in the event of fire signal complete as required and as per specifications and excluding actuator.	SMT	1		0
	b) Damper Actuator				
	Supply, installation and testing of motorised spring return actuator for devices upto 0.8 sq. metre with with control panel & temperature sensor.	NO.	1		0
18)	Grilles, Diffusers, VCD				
	Supply, installtion and testing of Powder coated Aluminium extruded grills / diffusers as per specifications given in tender and of following sizes.				
	a) Single louvered supply / return air registers (Grills)	SMT	30		0
	b) Supply / return square ceiling air terminals (diffusers) to be measured with neck area.	SMT	10		0
	c) Fresh / Exhaust air louvers with bird screen & damper for AC application	SMT	2		0
	d) Fresh / Exhaust air louvers with bird screen for General Ventilation application	SMT	1		0
	e) Volume control Dampers to be provided in supply & Exhaust air registers / terminals.	SMT	20		0
	f) Fixed bar linear air register of following sizes				
	i) 100 mm	RMT	25		0
	ii) 150 mm	RMT	40		0

S.No.	Description Of Equipments / Materials	Unit	Qty.	Rate	Amount
	iii) 200 mm	RMT	50		0
	g) Slot linear air diffusers of following sizes				
	i) 2 Slot	RMT	10		0
	ii) 3 Slot	RMT	15		0
	h) Supply, installation and testing of GI Louvers constructed with casing in 14 G & louvers in 18 G construction for supply / exhaust air application for ventilation fan including bird screen, fixing members, rain protector, free area of 55% etc as required to suit the site conditions.	SMT	1		0
19)	Duct Damper				
	Supply, installation and testing of multiblade box type Galvanized Sheet Steel construction duct damper / non return damper / back draft damper to be provided with suitable links and quadrants for control of volume of air.	SMT	4		0
20)	Under Deck Insulation of Exposed Roof				
	Supplying and fixing of under deck thermal insulation on exposed roof with 75 mm thick expanded polystyrene with overlape edging of density 20 Kg/m ³ after applying tarfelt, pasted with suitable adhesive, all longitudinal and transverse joints filled with adhesives & finally fixed with the help of rawl plug & dash fasteners in ceiling.	SMT	550		0
21)	Electrical Sub Panel				
	Supply, installation, testing and commissioning of cubical wall / floor mounted type switch board as detailed below & switch gears suitable for AC-23 duty including making interconnection etc as required.				
21a)	For AHU Fan Motor Up to 3.73 Kw	NO.	8		0
	32 A 3 Pole MCCB with 16 A DOL starter, overload relay, start / stop push buttons, phase indication lights with SP MCB, on / off / trip indication lights with SP MCB, single phase preventer & auto / manual mode selector switch for BMS application. SET-01				
	Note:- Controls and Interlocking as required of all the above panels shall be included in panel costing.				
22)	Single Phase MCB Inline / Propeller Fan / VRV Indoor Unit				
	Supply, Installation, testing & Commissioning of single phase MCB of following capacity:				
	6A / 10 A / 16 A SP MCB, SET-01	NO.	30		0
23)	Isolators For VRV ODU / Hi Wall ODU				

S.No.	Description Of Equipments / Materials	Unit	Qty.	Rate	Amount
	Isolator switch with ELCB for VRV ODU / Hi Wall ODU with sheet metal enclosure, rain protection etc. as required to suit the site condition.				
	a) 32 A Single Phase	NO.	4		0
	b) 40 A Three Phase	NO.	11		0
	c) 63 A Three Phase	NO.	2		0
24)	Power & Control Cabling				
	Supply, laying, testing and commissioning of power and control cabling as per specification given in the tender. Power cabling of XLPE insulated Copper conductor armoured cables of 1.1 KV Grade including cable end termination with brass compression glands & tinned copper lugs etc as per specification.				
	A) Power Cabling				
	i) For Motor Up to 3.73 Kw				
	1 x 3C x 4 Sq. mm	RMT	15		0
	ii) For Inline Fan / Propeller Fan / VRV IDU				
	1 x 3 C x 1.5 Sq. mm Copper Flexible Cable	RMT	50		0
	1 x 3 C x 2.5 Sq. mm Copper Flexible Cable	RMT	15		0
	iii) For Hi Wall Unit				
	1 x 3 C x 4.0 Sq. mm Copper Flexible Cable	RMT	20		0
	iv) For VRV Outdoor Unit				
	1 x 3 C x 4.0 Sq. mm Copper Flexible Cable	RMT	5		0
	1 x 3 C x 6.0 Sq. mm Copper Flexible Cable	RMT	50		0
	1 x 3 C x 10.0 Sq. mm Copper Flexible Cable	RMT	10		0
	B) Control cabling (PVC insulated Copper conductor of 1.1 KV Grade armoured cable)				
	i) 3C x 1.5 Sq. mm	RMT	15		0
	ii) 4C x 1.5 Sq. mm	RMT	20		0
	iii) 5C x 1.5 Sq. mm	RMT	80		0
	iv) 3C x 2.5 Sq. mm	RMT	25		0
	C) Transmission & Control Wiring For VRV System				
	Providing & fixing of control cum trans-mission wiring of copper between indoor and out door unit in 25 mm PVC Conduit.				

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	3C / 2C x 1.5 Sq mm	RMT	585		0
25)	Earthing Strip / Wires as per specs.				
	i) Supply & laying of 6 SWG GI wire or in recess for loop earthing as required.	RMT	140		0
	ii) Supply & laying of 8 SWG GI wire or in recess for loop earthing as required.	RMT	20		0
	iii) Supply and laying of rubber mat of size 1000 mm & 12.5 mm thick.	RMT	5		0
26)	Cable Tray				
	Supplying and installing following size of perforated GI cable trays including bends, tee, reducers etc with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with GI suspenders including bolts & nuts, suspenders etc as required.				
	a) 100 mm wide x 50 mm depth x 1.6 mm thickness.	RMT	50		0
	b) 150 mm wide x 50 mm depth x 1.6 mm thickness.	RMT	75		0
	c) 300 mm wide x 50 mm depth x 1.6 mm thickness.	RMT	45		0
	d) 450 mm wide x 50 mm depth x 2.0 mm thickness.	RMT	35		0
	e) 600 mm wide x 50 mm depth x 2.0 mm thickness.	RMT	80		0
27)	Starter for Propeller / Inline fan (Single Phase)				
	Supply, Installation, Testing & Commissioning of modular type single phase motor starter up to 6 A / 10 A / 16 A (Rating shall be as per motor) including 3" x 3" x 2.5" G.I. Box with modular, modular cover plate, conduiting and wiring from starter to fan etc as required at site.	Set	30		0
28)	Junction Box For FCU / Propeller / Inline Fan etc (Single Phase)				
	Supply, Installation, Testing & Commissioning of 4" x 3" x 3" G.I. Box with modular type 6A / 10A / 16A socket & switch, modular cover plate etc as required at site.	Set	30		0
	NOTE:				
	1) The contractor shall provide fire shunt relay contact in his panel wherever necessary along with auto / manual mode selector switch in the outgoing feeder for AHU Fan, Ventilation & Pressurization fan etc. to take fire input signal (Potential Free Contact). Cost shall be included in the panel price quoted by them.				

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	2) Bidders may make minor adjustment in the VRV / VRF Outdoor Unit Capacity as per manufacturer standard keeping the total specified capacity in tender as same.				
	3) Minor adjustment in VRV / VRF Indoor Unit Capacity may also be done as per manufacturer standard without disturbing the inside temperature.				
	Total contract price inclusive of all taxes & duties as applicable Amritshar, Punjab.				0