LADY HARDINGE MEDICAL COLLEGE & ASSOCIATED HOSPITALS NEW DELHI
(Ministry of Health & Family Welfare, Govt. of India)

Date: 27.01.2022

Amendment No. – III

Project Name: Supply Installation, Testing & Commissioning of independent Central air Conditioning system for the proposed additional works of OPD, IPD, Accidental & Emergency Block and Other Associated Services at Lady Hardinge Medical College & Associated Hospitals, New Delhi and their Maintenance during Defect Liability Period.

Tender no: HSCC/LHMC/HVAC/2021.

This has reference to the subject works

The following Amendment-III may be noted, which shall be treated as a part of tender to be submitted online duly signed & stamp along with tender.

1. Please find enclosed the revised BOQ of HVAC as an Amendment-VII at Annexure-I Revised BOQ of HVAC Work.

2. **The last date of online fill/upload the tender has been extended as follows:**

Last Date to fill/upload the tender through e-Tendering : 03.02.2022 up to 15:00hrs
Date of opening of bids : 03.02.2022 at 15:30 hrs

The validity of Bid Security shall be considered from the original date of submission of bids. i.e. 17.01.2022.

All other terms & conditions of tender shall remain unchanged.

Prospective bidders are advised to regularly scan through HSCC e-tender portal http://www.tenderwizard.com/HSCC as corrigendum/amendments etc., if any, will be notified on this portal only and separate advertisement will not be made for this.

(-Sd-)

General Manager (Projects), HSCC (I) Ltd.
For & on Behalf of Director, LHMC, New Delhi

LADY HARDINGE MEDICAL COLLEGE & ASSOCIATED HOSPITALS (LHMC), NEW DELHI

TENDER

FOR

Supply Installation, Testing & Commissioning of independent Central air Conditioning system for the proposed additional works of OPD, IPD, Accidental & Emergency Block and Other Associated Services at Lady Hardinge Medical College & Associated Hospitals, New Delhi and their Maintenance during Defect Liability Period

VOLUME – V

Amended Bill of Quantities

December'2021

HSCC (INDIA) LTD.
(CONSULTANTS & ENGINEERS FOR MEGA HOSPITALS & LABORATORIES)
E-6(A), sector-1, NOIDA(U.P) 201301 (India)

Phone : 0120-2542436-40 Fax : 0120-2542447

Tender No. HSCC/LHMC/HVAC/2021

ADDITIONAL WORKS AT HOSPITAL BLOCK AT "LADY HARDINGE MEDICAL COLLEGE (LHMC), NEW DELHI		
Name of Bidder M/s.		
	SUMMARY SHEET FOR HVAC WORKS	
SECTION	**DESCRIPTION OF WORK**	**AMOUNT(Rs.)**
A	**EQUIPMENTS**	
B	**PIPING**	
C	**AIR DISTRIBUTION**	
D	**ELECTRICAL**	
	GRAND TOTAL	

BILL OF QUANTITIES (B.O.Q) FOR ADDITIONAL WORKS AT HOSPITAL BLOCK AT "LADY HARDINGE MEDICAL COLLEGE (LHMC), NEW DELHI

The prices are to be quoted in the below mentioned form and shall include the supply, installation, testing & commissioning at site of all the equipments, ancillary materials as specified and all such items what so ever which may be required to fulfill the intent and purpose as laid down in the specifications and or the drawings.

The tenderer shall quote rates in figures and in words under column 6&7 and extend amount to column 8

Item No. 1	DSR/ NDSR 2	Description 3	Qty. 4	Unit 5	Rate in Rs (in Figure) 6	Rate in Rs. (in words) 7	Amount in Rs (in Figure) 8
Note:		**All Equipment will be BMS Compatiable with BACnet / MODbus protocol**					
A)		**EQUIPMENTS**					
1.0	NDSR	**WATER CHILLING UNITS.**					
1.1		Supply, Installation, Testing and Commissioning of water cooled centrifugal type Water chiller machines (ARI Certified) each having a capacity of 900 TR at chilled water inlet/outlet temperature of 12.22°C /6.6°C with chilled water circulation rate of 2160 GPM (nominal) and condenser water inlet/outlet temprature of 32.2°C/37.8°C with circulation rate of 2700 GPM (Nominal), suitable for operation on refrigerant R134a each comprising of the following complete as per specification and as required.					
a)		1 No.- centrifugal type compressor semi hermatic / open type, automatic capacity control, safety switches, speed, increasing gears, forced feed lubrication system etc. as per specifications.					
b)		1 No.- Suitable capacity squirrel cage induction motor with class 'F' insulation suitable for operation on 400±10% volts, 50 Hz A.C. supply.					
c)		1 No. Variable speed / frequency starter suitable for compressor motor complete with active armonic filters complying to IEEE519 for hospitals, ammeter with CT's over load protection, under voltage protection against phase reversal and independent single phase preventors etc. complete as required.					
d)		Necessary drive arrangement.					
e)		1 Set- Lubrication Device consisting of automatic electric oil pump, oil cooler, head tank, oil strainer, automatic pressure regulating valve, oil heater, oil heater thermal switch etc. as per spesifications.					
f)		1 No.- Matching shell and tube water cooled condenser of M.S. shell and integrally finned copper tubes.					
g)		1 No.- Matching shell and tube flooded type chiller of M.S. shell and integrally finned copper tubes.					
h)		1 Lot- refrigerant piping fittings, valve and accessories to inter connect compressor, condenser, chiller and expansion valve.					
i)		1 Set- Advanced Microprocessor based control pannel (coloured & graphical display) complete with accessories as per specifications.					
j)		Lot- Refrigerant line accessories comprising of safety valves, angle valve, liquid line indications, liquid levelcontrol etc.					

Item No. 1	DSR/ NDSR 2	Description 3	Qty. 4	Unit 5	Rate in Rs (in Figure) 6	Rate in Rs. (in words) 7	Amount in Rs (in Figure) 8
k)		Lot- water flow switches at inlet and outlet of condenser & chiller, water drain and air purge valves wherever required.					
l)		Lot- Suction line and chiller insulation with minimum 19 mm thick polyvinyl nitrile rubber insulation finished with 0.63 mm thick G.S.S. cladding complete as required.					
m)		Lot- Frame work for mounting the above condenser, chiller, compressor and motor with base plate complete					
n)		Lot- Initial/First charge of refrigerant gas and compressor oil.					
o)		Max IkW/TR - 0.66					
p)		C.O.P at ARI conditions > 6.3					
1.1.1		Cooling Capacity-:900TR					
1.1.2		Water in condenser in/out : 32.2 °C / 37.8 °C					
1.1.3		Chilled water 'In' : 12.22 °C					
1.1.4		Chilled water 'Out' : 6.7 °C					
1.1.5		Chiller Fouling Factor : 0.0005					

Item No. 1	DSR/ NDSR 2	Description 3	Qty. 4	Unit 5	Rate in Rs (in Figure) 6	Rate in Rs. (in words) 7	Amount in Rs (in Figure) 8
1.1.6		Condenser Fouling Factor : 0.001					
1.1.7		Max IKW/TR: 0.66					
1.1.8		Configuration :- 2 Working & 1 Stand by	3	Nos			
1.2	NDSR	**Plant Room Manager**					
1.2.1		Plant room manager make shall be same as the chiller make. Plant Room Manager for sequencing, remote monitoring, controlling and report generation of all equipment in AC plant room/high side. Selected controler shall have capabity to meet detailed IO summary mentioned under specifications. Supervisory Controller for management level interface in MS enclosure 16 SWG thickness, powder coated SIEMENS grey for SUPERVISORY CONTROLLER, IO CARDS (with accessories like Transformer, MCB, internal wiring and Relays with bases). Workstation having latest configuration computer 3 GHz with 500 GB hard disk, 21" TFT monitor, 104 windows key board, mouse,serial and parallel ports laser printer. This must have software integration with IBMS for 3rd party interface avaiable on Bacnet / Modbus. Cabling & Conduit work as required.	1	Nos			0.00
2.0	NDSR	**WATER CIRCULATION PUMPS**					
2.1		**Primary Chilled Water Pumps**					
		Supply, installation, testing and commissioning of split casing end suction type centrifugal chilled water pump sets factory assembled and tested for rated efficiency mounted on a common base frame etc each capable of delivering specified flow rate complete with following as per specifications & schedule of equipments.					
		a. Pump with IP 55 TEFC induction motor with class F insulation, IE-3.					
		b. Channel base with vibration isolators, coupling, coupling guard etc.					
		c. Cladded insulation and anti corrosive coating inside and outside casing etc. of chilled water pump.					
		d. 2 Nos.- 150 mm dia dial type pressure gauge					
		e. Pumps shall be suitable for operation on 415+/- 10% Volts/ 3ph / 50 Hz/AC power supply.					
		f.Bellows in suction and discharge line for vibration isolation of suitable capacity.					
		The pump characteristic shall be as follows:					
2.1.1	NDSR	Water flow rate=2160 USGPM					
		Head = 15 Metre WC					
		Primary chilled water pumps as described above. (2W+1S)	3	Nos			0.00
2.2		**Secondary Pumps & Variable Speed Pumping System**					
		Supply, installation, testing and commissioning of split casing type centrifugal chilled water recirculation pumps mounted on a common base etc each capable of delivering specified flow rate complete with following as per specifications & schedule of equipments.					
		a. Pump with IP 55 S1 duty TEFC induction motor with class F insulation, IE-3.					

Item No. 1	DSR/ NDSR 2	Description 3	Qty. 4	Unit 5	Rate in Rs (in Figure) 6	Rate in Rs. (in words) 7	Amount in Rs (in Figure) 8
		b. Suction guide , tripple duty valve to be supplied by pump OEM.					
		c. Cladded insulation and anti corrosive coating inside and outside casing etc. of chilled water pump.					
		d. 2 Nos.- 150 mm dia dial type pressure gauge					
		e. Pumps shall be suitable for operation on 415+/- 10% Volts/ 3ph / 50 Hz/AC power supply.					
		f. The price will include control software and networking hardware and software for integration and compatibility with BMS (BACNET Protocol) from the pump supplier.					
		g. All pumps to be provided with seperate VFD's (variable frequency drives) and separate control panel . Panel should also consist of cooling fan.					
		h.Bellows in suction and discharge line for vibration isolation of suitable capacity.					
		i. Complete set system to be mounted on a common MS base frame and shall follow following duty.					
		The pump characteristic shall be as follows:					
2.2.1	NDSR	Water flow rate=2160 USGPM					
		Head = 28 Metre WC					
		Secondary chilled water pumps as described above. (2W+1S)	3	Nos			0.00
2.2.2	NDSR	Water flow rate= 680 USGPM					
		Head = 30 Metre WC					
		Secondary Hot water pumps as described above. (2W+1S)	3	Nos			0.00
2.3		**Condenser water Pumps**					
		Supply, installation, testing and commissioning of end suction back pull out type vertical split casing centrifugal pump sets factory assembled and tested for rated efficiency mounted on a common base frame etc each capable of delivering specified flow rate complete with following as per specifications & schedule of equipments.					
		a. Pump with IP 55 TEFC induction motor with class F insulation, IE-3.					
		b. Channel base with vibration isolators, coupling, coupling guard etc.					
		c. Cladded insulation and anti corrosive coating inside and outside casing etc. of chilled water pump.					
		d. 2 Nos.- 150 mm dia dial type pressure gauge					
		e. Pumps shall be suitable for operation on 415+/- 10% Volts/ 3ph / 50 Hz/AC power supply.					
		f.Bellows in suction and discharge line for vibration isolation of suitable capacity.					
		The pump characteristic shall be as follows:					
2.3.1	NDSR	Water flow rate=2700 USGPM					
		Head = 28 Metre WC					
		Condenser water pumps as described above. (2W+1S)	3	Nos.			0.00
3.0	NDSR	**COOLING TOWER (CTI Certified)**					

Item No. 1	DSR/ NDSR 2	Description 3	Qty. 4	Unit 5	Rate in Rs (in Figure) 6	Rate in Rs. (in words) 7	Amount in Rs (in Figure) 8
		Supply, installation, testing and commissioning of induced draft FRP type cooling towers for air conditioning system. Each tower shall be complete with distribution system, filling, louvers, steel ladder, fan & motor . Motor shall be IP 55 suitable for outdoor installation, 415±10% volts, 50 Hz, 3 phase power supply, IE-3 and insulation calss F. Isolator enclosed in weather proof panel complete with earthing shall be included. Tower shall be selected on basis of water temperature 97.5 -90 degree F, ambient wet bulb 83 deg F. Cooling tower shall be compatible for working with BMS. The cooling tower shall be suitable for **The cooling tower shall be suitable for 900 TR Centrifugal Chillers**. Heat rejection should be minimum 13500000 BTUs/hr. Capacity shall be as follows:-					
3.1		Water flow rate=2700 USGPM					
		Cooling Tower as described above. (2W+1S)	3	Nos.			0.00
4.0	NDSR	**WATER HEATING ARRANGEMENT**					
4.1	NDSR	**Hot Water Generator**					
		Supply, installation, testing & commissioning of Electric Hot Water Generator for winter heating/monsoon reheating system. Hot water generator shall be complete with controls, sensors, controll cabling ,piping and fittings, thermal insulation, base frame etc. as per specifications. HWG shall be BMS compatible with RS 485 communication port.					
4.1.1		Capacity : 400 KW					
		Status : (2W+1S)					
		Temp IN/OUT : 110/125 DegF	3	Nos.			0.00
4.2	NDSR	**MONSOON REHEAT ARRANGEMENT**					
		Supply of monsoon reheating arrangements fixed in ducts/ plenums complete with strip heaters, fixing frame work, insulators, fire protection insulation in duct, controls such as heating thermostats, humidistats etc. The heaters banks shall be controlled by independent thermostats/ humidistats through electro magnetic type contactors and safety thermostats/ geyserstats as specified complete with wiring for intercinnections with 1.5 sq.mm copper conductor multi core armoured cable. The heater capacity shall be as per schedule of equipment and specifications, drawing etc.					
4.2.1		6 kw (3 KW x 2 banks)	24	Nos.			0.00
5.0	NDSR	**AIR HANDLING UNITS**					

Item No. 1	DSR/ NDSR 2	Description 3	Qty. 4	Unit 5	Rate in Rs (in Figure) 6	Rate in Rs. (in words) 7	Amount in Rs (in Figure) 8
5.1		Supply, installation, testing and commissioning of sectional construction draw through type Air Handling Units (double skin type) of horizontal /2-tier as specified & shown in schedule of equipment complete with the following :-					
		a. Fan Section and canvas connection, Mixing Box, Thermal break profile. (double skin type)					
		b. Centrifugal blower					
		c. Coil section with cooling coil, heating coils as per specifications.Minimum 2 bend GSS/PVC eleminators.					
		d. Pre filters with filter section in all AHUs.					
		e. Fine and hepa filters with filter section wherever specifically specified as per AHU schedule .Wherever fine/hepa filters are specified, item shall include factory fabricated double skin plenum of same specifications as AHU panels and complete with filter frameworks.					
		f. Drain pan, drain connection.					
		g. Squirrel cage induction IP 55 TEFC , Insulation class 'F', Duty S1 , IE-3 drive motor, drive arrangement, guard etc. All AHU motors shall be compatible for working with VFD.					
		h. Necessary vibration isolators & supporting arrangement.					
		i. Fresh air intake arrangement, necessary water drain & air purge valves wherever required etc.					
		j. Canvass connections,necessary foundations, 2 nos pressure gauge, 2 nos thermometer etc					
		k. Controls for AHUs comprising of a set of PN-16 rating **2 Way pressure independent dynamic balancing cum control valve of required size fitted with modulating actuators** having manual override facility on each AHU alongwith wiring for interconnections with 1.5 sq. mm Cu Conductor multicore armoured complete as required. The actuator shall have required shut off capability of minimum 4 bar rating. The acuator shall be compatible with BMS. The valve actuator shall be capable of accepting 2-10 volt DC, 4-20 mA electric signal and shall provide similar transduced feedback output signal to control system.					
		l. Pre Filter : 90% down to 10 micron(MERV-7), Fine filter : 99% down to 3 micron(MERV-14), HEPA filter 99.97% down to 0.3 micron (MERV-17).					
5.1.1	NDSR	2500 CFM / 6RD Cooling Coil/ 135 mm static (with pre & fine filter)	3	Nos.			0.00
5.1.2	NDSR	3000 CFM / 6RD Cooling Coil/ 135 mm static (with pre & fine filter)	3	Nos.			0.00
5.1.3	NDSR	3000 CFM / 6RD Cooling Coil/ 80 mm static (with pre & fine filter)	1	Nos.			0.00
5.1.4	NDSR	3500 CFM / 6RD Cooling Coil/ 135 mm static (with pre & fine filter)	3	Nos.			0.00
5.1.5	NDSR	5000 CFM / 6RD Cooling Coil/ 80 mm static (with pre & fine filter)	1	Nos.			0.00
5.1.6	NDSR	5500 CFM / 6RD Cooling Coil/ 80 mm static (with pre & fine filter)	1	Nos.			0.00
5.1.7	NDSR	6000 CFM / 6RD Cooling Coil/ 80 mm static (with pre & fine filter)	2	Nos.			0.00
5.1.8	NDSR	6500 CFM / 6RD Cooling Coil/80 mm static (with pre & fine filter)	1	Nos.			0.00
5.1.9	NDSR	7000 CFM / 6RD Cooling Coil/80 mm static (with pre & fine filter)	4	Nos.			0.00

Item No. 1	DSR/ NDSR 2	Description 3	Qty. 4	Unit 5	Rate in Rs (in Figure) 6	Rate in Rs. (in words) 7	Amount in Rs (in Figure) 8
5.1.10	NDSR	8000 CFM / 6RD Cooling Coil/80 mm static (with pre & fine filter)	3	Nos.			0.00
5.1.11	NDSR	8500 CFM / 6RD Cooling Coil/80 mm static (with pre & fine filter)	1	Nos.			0.00
5.1.12	NDSR	9000 CFM / 6RD Cooling Coil/80 mm static (with pre & fine filter)	1	Nos.			0.00
5.1.13	NDSR	10000 CFM / 6RD Cooling Coil/80 mm static (with pre & fine filter)	10	Nos.			0.00
5.1.14	NDSR	11000 CFM / 6RD Cooling Coil/80 mm static (with pre & fine filter)	1	Nos.			0.00
5.1.15	NDSR	12000 CFM / 6RD Cooling Coil/80 mm static (with pre & fine filter)	7	Nos.			0.00
5.1.16	NDSR	14000 CFM / 6RD Cooling Coil/80 mm static (with pre & fine filter)	1	Nos.			0.00
5.1.17	NDSR	15000 CFM / 6RD Cooling Coil/80 mm static (with pre & fine filter)	11	Nos.			0.00
5.1.18	NDSR	16000 CFM / 6RD Cooling Coil/80 mm static (with pre & fine filter)	7	Nos.			0.00
5.1.19	NDSR	18000CFM / 6RD Cooling Coil/80 mm static (with pre & fine filter)	6	Nos.			0.00
5.1.20	NDSR	20000CFM / 6RD Cooling Coil/80 mm static (with pre & fine filter)	1	Nos.			0.00
5.1.21	NDSR	22000CFM / 6RD Cooling Coil/80 mm static (with pre & fine filter)	8	Nos.			0.00
5.1.22	NDSR	24000CFM / 6RD Cooling Coil/80 mm static (with pre & fine filter)	1	Nos.			0.00
5.1.23	NDSR	25000CFM / 6RD Cooling Coil/80 mm static (with pre & fine filter)	1	Nos.			0.00
5.1.24	NDSR	26000CFM / 6RD Cooling Coil/80 mm static (with pre & fine filter)	7	Nos.			0.00
6.0		**EXPANSION TANK**					
		Supply, installation, testing and commissioning of pressurised closed type Expansion tank with air seperator and dosing pumps(1w+1s) etc. The expansion tank shallbe complete with all necessary valves, vent connection. Quoted price shall include of 50 mm thick 32 kg/mt cu density TF quality Expanded polystyrene insulation and cladded with 26 gauge aluminum sheet. Tank shall be equiped with 15 mm dia vent, 450 mm dia manhole with cover, 40 mm dia make up with overflow connection (ball valve shouldbe provided at the make up line), 50 mm dia drain and over flow withnecessary valves and 50 mm dia insulated pipe connection to nearest chilled water return line					
6.1	NDSR	3000 ltrs.	1	No.			0.00
6.1	NDSR	2000 ltrs.	1	No.			0.00
		Total EQUIPMENTS					**0.00**
B)		**PIPING**					
7.0		**CONDENSER WATER PIPING & VALVES**					

Item No. 1	DSR/ NDSR 2	Description 3	Qty. 4	Unit 5	Rate in Rs (in Figure) 6	Rate in Rs. (in words) 7	Amount in Rs (in Figure) 8
	16.1	Supplying, fixing, testing and commissioning of condenser water pipes of following sizes of MS 'C' class along with necessary clamps, vibration isolators and fittings such as bends,tees etc.but excluding valves, strainers, gauges etc. adequately supported on rigid supports duly painted/buried in ground excavation and refilling etc. as per specification and as required complete in all respect. Note:-The Pipes size 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. And from minimum 7mm thick MS sheet for pipes of 400 mm dia and above.					
7.1	NDSR	450 mm dia	200	RM			0.00
7.2	16.10.1	300 mm dia	60	RM			0.00
7.3	16.10.2	250 mm dia	10	RM			0.00
7.4	16.10.3	200 mm dia	10	RM			0.00
7.5	16.10.4	150 mm dia	30	RM			0.00
7.6	16.10.5	125 mm dia	20	RM			0.00
7.7	NDSR	80mm dia	30	RM			0.00
8.0		**Valves without insulation**					
		Supplying, fixing, testing and commissioning of following valves, gauges and strainers for condenser water circulation as per specifications.					
8.1	16.11.1	**Butterfly valves (manual) :** with C I body SS disc nitrile sheet & O - ring & PN 16 pressure rating as specified.					
8.1.1	NDSR	300 mm dia.	9	Nos			0.00
8.1.2	NDSR	250 mm dia.	3	Nos			0.00
8.1.3	16.11.1.4	100 mm dia.	3	Nos			0.00
8.2	16.11.3	**Motorized Butterfly Valves**					
		Providing and fixing the following motorized butterfly valves as per specifications and drawings.					
8.2.1	16.11.3.1	300 mm dia.	9	Nos.			0.00
8.3		**Balancing Valves**					
		Supply, installation, testing and commissioning of balancing valves in return condenser water line of each condenser and cooling tower as per tender specification & of following sizes:					
8.3.1	NDSR	300 mm dia (For Condenser & Cooling Towers)	6	Nos			0.00
8.4		**Non return/Check valves :** with dual plate of CI body SS plates vuicanized NBR seal flanged end & PN 16 pressure rating as specified.					
8.4.1	NDSR	300 mm dia.	3	Nos			0.00
8.5		**Pot strainer with drain valve**					
8.5.1	NDSR	450 mm dia.	1	Nos			0.00

Item No. 1	DSR/ NDSR 2	Description 3	Qty. 4	Unit 5	Rate in Rs (in Figure) 6	Rate in Rs. (in words) 7	Amount in Rs (in Figure) 8
8.6		**Suction Guide**					
8.6.1	NDSR	300 mm dia.	3	Nos			0.00
9.0		**INSULATED CHILLED WATER PIPING**					
	16.3	Supplying, laying/ fixing, testing and commissioning of following nominal sizes of chilled water piping plumbing inside the building (with necessary clamps, vibration isolators and fittings but excluding valves, strainers, gauges etc.) duly insulated with fire retardant quality expanded polystrene moulded pipe section of density 20 kg/cu.m after a thick coat of cold setting adhesive (CPRX compound) and 0.63 mm thick Aluminium sheet cladding as per specifications and as required complete in all respect. **Note**:-The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above.					
9.1	16.3.1	400 mm dia (75 mm insulation)	180	RM			0.00
9.2	16.3.3	300 mm dia (75 mm insulation)	50	RM			0.00
9.3	16.3.4	250 mm dia (75 mm insulation)	25	RM			0.00
9.4	16.3.5	200 mm dia (75 mm insulation)	20	RM			0.00
9.5	16.3.6	150 mm dia (75 mm insulation)	10	RM			0.00
9.6	16.3.7	125 mm dia (50 mm insulation)	5	RM			0.00
9.7	16.3.8	100 mm dia (50 mm insulation)	70	RM			0.00
9.8	16.3.9	80 mm dia (50 mm insulation)	140	RM			0.00
9.9	16.3.10	65 mm dia (50 mm insulation)	200	RM			0.00
9.10	16.3.11	50 mm dia. (50 mm insulation)	70	RM			0.00
9.11	16.3.12	40 mm dia. (50 mm insulation)	120	RM			0.00
9.12	16.3.13	32 mm dia (50 mm insulation)	50	RM			0.00
10.0		**INSULATED VALVES & STRAINERS**					
		Supplying, fixing, testing and commissioning of following valves, strainers, gauges in the chilled water plumbing duly insulated to the same specifications as the connected piping and adequately supported as per specifications.					
10.1		**Butterfly valves (Manual) :** with C I body SS Disc, Nitrile Rubber Seal & O- Ring PN 16 pressure rating for chilled water/ hot water circulation as specified					
10.1.1	NDSR	400 mm dia.	3	Nos			0.00
10.1.2	NDSR	300 mm dia.	15	Nos			0.00

Item No. 1	DSR/ NDSR 2	Description 3	Qty. 4	Unit 5	Rate in Rs (in Figure) 6	Rate in Rs. (in words) 7	Amount in Rs (in Figure) 8
10.2		**Motorized Butterfly Valves**					
		Providing and fixing the following motorized butterfly valves for chilled water pumps and boiler as per specifications.					
	NDSR	300 mm dia.	3	Nos.			0.00
10.3		**Balancing valves :** with C I body flanged construction with EPDM coated disc with long pitch with protected out pipe insulation & PN 16 pressure rating for chilled / hot water circulation as specified.					
	NDSR	300 mm dia.	3	Nos			0.00
10.4		**Non return/Check valves :** with duel plate of C I body SS plates vulcanized NBR seal flanged end & PN 16 pressure rating for chilled / hot water circulation including insulation as specified					
	NDSR	300 mm dia.	6	Nos			0.00
10.5	16.7.4	**Y- strainers** of Ductile CI Body flanged ends with stainless steel strainer for chilled / hot water circulation including insulation as specified.					
10.5.1	16.7.4.4	100 mm dia.	8	Nos			0.00
10.5.2	16.7.4.5	80 mm dia.	16	Nos			0.00
10.5.3	16.7.4.6	65 mm dia	25	Nos			0.00
10.5.4	16.7.4.7	50 mm dia	8	Nos			0.00
10.5.5	16.7.4.8	40 mm dia	6	Nos			0.00
10.5.6	NDSR	32 mm dia	14	Nos			0.00
10.5.7	NDSR	25 mm dia	6	Nos			0.00
10.6		**Suction Guide**					
		Providing and fixing of suction guide of following sizes in the inlet of chilled water pumps as per specifications					
	NDSR	300 mm	6	Nos.			0.00
11.0		**DRAIN PIPING**					
		Supply, laying/fixing, testing and commissioning of G.I. medium class ERW piping confirming to IS:1239 with necessary clamps, supports, anti vibration mountings, hangers and fittings such as bends, tees, reducers etc. duly insulated and painted as per specifications for condensate drain from air handling units and chillers etc.					
11.1	NDSR	50 mm dia	50	RM			0.00
11.2	NDSR	40 mm dia	100	RM			0.00
11.3	NDSR	32 mm dia	100	RM			0.00
11.4	NDSR	25 mm dia	50	RM			0.00
12.0	NDSR	**Pressure Gauges**					
		Providing and fixing of pressure gauge complete as per specifications and drawings.	24	Nos.			0.00

Item No. 1	DSR/ NDSR 2	Description 3	Qty. 4	Unit 5	Rate in Rs (in Figure) 6	Rate in Rs. (in words) 7	Amount in Rs (in Figure) 8
13.0		**Temperature Gauge**					
	NDSR	Providing and fixing of temperature gauge complete as per specifications and drawings.	8	Nos.			0.00
14.0		**Auto Air Vent Valves**					
14.1	NDSR	15 mm dia	10	Nos			0.00
14.2	NDSR	20 mm dia	15	Nos			0.00
14.3	NDSR	25 mm dia	15	Nos			0.00
15.0		**Drain Valves**					
15.1	NDSR	25 mm dia	3	Nos			0.00
15.2	NDSR	32 mm dia	3	Nos			0.00
15.3	NDSR	50 mm dia	3	Nos			0.00
16.0		**Ball Valves**					
16.1	NDSR	25 mm dia	5	Nos			0.00
16.2	NDSR	32 mm dia	5	Nos			0.00
16.3	NDSR	40 mm dia	5	Nos			0.00
16.4	NDSR	50 mm dia	5	Nos			0.00
		Total PIPING					**0.00**
C.		**AIR DISTRIBUTION**					
		DUCTING					
17.0		GSS DUCTING					
	16.12.1	Supply, installation, testing and commissioning of site fabricated GSS sheet metal rectangular ducting complete with rubber gaskets, elbows, splitter dampers, vanes, hangers, supports etc. as per approved drawings and specifications of following sheet thickness complete as required.					
17.1	16.12.1.1	24 Gauge	250	Sqm.			0.00
17.2	16.12.1.2	22 Gauge	500	Sqm.			0.00
17.3	16.12.1.3	20 Gauge	500	Sqm.			0.00
18.0		**FIRE DAMPERS**					
	16.2	Supplying, Fixing,testing and commissioning of fire dampers in supply air duct/main branch and return air path as and where required of required sizes i/c control wiring,the damper shall be motorized 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.					
18.1	16.20.1	Fire Damper	10	Sqm			0.00
18.2	16.20.2	Actuator	20	Sets			0.00
19.0		**DUCT INSULATION**					

Item No. 1	DSR/ NDSR 2	Description 3	Qty. 4	Unit 5	Rate in Rs (in Figure) 6	Rate in Rs. (in words) 7	Amount in Rs (in Figure) 8
	16.2	Supplying and fixing of following thickness duly laminated aluminum foil of mat finish closed cell Nitrile rubber (class "O") insulation on existing duct after applying suitable adhesive for nitrile rubber. The joints shall be sealed with 50 mm wide and 3 mm thick self adhesive nitrile rubber tape insulation complete as per specifications and as required.					
19.1	16.23.1	19 mm	1250	Sqm.			0.00
20.0		**ACOUSTIC INSULATION**					
		Supply and fixing of Armasound Acoustic insulation complete as required and as per specifications.					
20.1	NDSR	25 mm	1250	Sqm.			0.00
		Total AIR DISTRIBUTION					**0.00**
	D	**ELECTRICAL**					
21.0		**AIR- CONDITIONING PANELS**					
		Supply, installation, testing and commissioning of A/C Panel, as per IEC 61439-1&2 cubicle type, totally enclosed, free standing type, dust, damp and vermin proof panel, powder coated, made up of CRCA sheet, complete with aluminum busbars, danger notice plate, interconnections with suitable capacity aluminum leads/solid aluminum strips/rods, necessary interlocking, and having incoming and outgoing switchgears as mentioned below. Complete as per technical specifications and as required.					
		Note :					
		i.All ACBs shall have spare contacts					
		ii.All ACBs should have Icw =Ics=Icu=50 KA for 1 sec					
		iii.All MCCBs shall have Ics=Icu=100%					
		iv.Separate fault indication for O/L, S/C, & E/F to be provided on Panel Door for all outgoing having microprocessor based MCCB					
		v.All indication Lamps will be LED Type .					
		vi.All starters shall be provided with digital ampere meter with suitable CTs, thermal overload relay, inbuilt/separate single phase preventer, contactors, timers, spare NO-NC contacts, push buttons, ON, OFF, TRIP indication (LED Type) and potential free contacts and relay for interlocking to FDA etc. complete as required.					
		vii.100 VA transformer 220v/24v AC for control wiring with 10 no.s 6A SP MCB 10 KA in all AHU panel is also in the scope of supply					
		viii.ACBs shall be BMS compatible with BACnet/ Modbus protocal					
		ix.All outgoing shall be provided with Stop / Manual /Auto selector switch to facilitate operation through BAS with RS 485 communication ports.					
		x.All out going shall be with extended rotary operating mechanism with door interlock, defeat feature and padlock facility. MCCB should be with spreader link and phase barriers. Indicating lamps(LED) with 6A protection MCBs to indicate OPEN, CLOSE, TRIP for MCCB.					
		xi) Time delay relay for automatic restart of AHU motor.					

Item No. 1	DSR/ NDSR 2	Description 3	Qty. 4	Unit 5	Rate in Rs (in Figure) 6	Rate in Rs. (in words) 7	Amount in Rs (in Figure) 8
		xii) 24 volts wiring to the 2/3 way valve and thermostats.					
		xiii) wiring for micro switch smoke sensor and solenoid valve, and for stopping the fan when smoke / fire occured through smoke sensor.					
		xiv) Control wiring with VFD. And in built fans for panel cooling.					
21.0		**AIR- CONDITIONING PANELS- MCC Panel**					
		Supply, installation, testing and commissioning of A/C Panel, as per IEC 61439-1&2 cubicle type, totally enclosed, free standing type, dust, damp and vermin proof panel, powder coated, made up of CRCA sheet, complete with aluminum busbars, danger notice plate, interconnections with suitable capacity aluminum leads/solid aluminum strips/rods, necessary interlocking, and having incoming and outgoing switchgears as mentioned below. Complete as per technical specifications and as required.					
		Note :					
		i.All ACBs shall have spare contacts					
		ii.All ACBs should have Icw =Ics=Icu=50 KA for 1 sec					
		iii.All MCCBs shall have Ics=Icu=100%					
		iv.Separate fault indication for O/L, S/C, & E/F to be provided on Panel Door for all outgoing having microprocessor based MCCB					
		v.All indication Lamps will be LED Type .					
		vi.All starters shall be provided with digital ampere meter with suitable CTs, thermal overload relay, inbuilt/separate single phase preventer, contactors, timers, spare NO-NC contacts, push buttons, ON, OFF, TRIP indication (LED Type) and potential free contacts and relay for interlocking to FDA etc. complete as required.					
		vii.100 VA transformer 220v/24v AC for control wiring with 10 no.s 6A SP MCB 10 KA in all AHU panel is also in the scope of supply					
		viii.ACBs shall be BMS compatible with BACnet/ Modbus protocal					
		ix.All outgoing shall be provided with Stop / Manual /Auto selector switch to facilitate operation through BMS with RS 485 communication ports.					
		x.All out going shall be with extended rotary operating mechanism with door interlock, defeat feature and padlock facility. MCCB should be with spreader link and phase barriers. Indicating lamps(LED) with 6A protection MCBs to indicate OPEN, CLOSE, TRIP for MCCB.					
		xi) Time delay relay for automatic restart of AHU motor.					
		xii) 24 volts wiring to the 2/3 way valve and thermostats.					
		xiii) wiring for micro switch smoke sensor and solenoid valve, and for stopping the fan when smoke / fire occured through smoke sensor.					
		xiv) Control wiring with VFD. And in built fans for panel cooling.					
21.1		**Main/ Emergency Air-conditioning MCC in plant room**					
		INCOMER					
		2 No. ACB Panels each having following:					

Item No. 1	DSR/ NDSR 2	Description 3	Qty. 4	Unit 5	Rate in Rs (in Figure) 6	Rate in Rs. (in words) 7	Amount in Rs (in Figure) 8
		1000A , 415 V, Motorised, Fully Drawout type (EDO), Four Pole, Air Circuit Breaker with microprocessor based overload, short circuit, Instantaneous & Earth Fault trip and lockable trip push button.					
		R, Y & B Phase indicating lamps (LED type) with 6A control SP MCBs.					
		Indicating lamps (LED Type) with 6A protection MCBs to indicate OPEN, CLOSE, TRIP for ACB.					
		Push button to Close the ACB.					
		1 Digital multifunction meter with suitable CTs.					
		Interlocking					
		BUSBARS					
		1000 Amps TPN busbars of aluminium with temperture rise of 40 degree celsius over and above ambient temperture of 45 degree celsius.					
		Bus Coupler					
		1 No. ACB Panels each having following:					
		1000A, 415 V, Motorised, Fully Drawout type (EDO), Four Pole, Air Circuit Breaker with microprocessor based overload, short circuit, Instantaneous & Earth Fault trip and lockable trip push button.					
		Indicating lamps (LED Type) with 6A protection MCBs to indicate OPEN, CLOSE, TRIP for ACB.					
		Push button to CLOSE the ACB.					
		1 Set of Digital Ammeter with ASS and CTs.					
		OUTGOING					
iii		3 Nos. MCCB feeder as per following details/ specifications:					
		400 Amp 415 volts, 50 KA (Ics=Icu), TPN MCCB microprocessor based, with O/L, S/C & E/F protection.					
		Extended rotary operating mechanism with door interlock, defeat feature and padlock facility. MCCB should be with spreader link and phase barriers.					
		3 Phase, fully automatic Star Delta starter for 90/100 hp condenser water pumps.					
iv		3 Nos. MCCB feeder as per following details/ specifications:					
		250 Amp 415 volts, 50 KA (Ics=Icu), TPN MCCB microprocessor based, with O/L, S/C & E/F protection.					
		Extended rotary operating mechanism with door interlock, defeat feature and padlock facility. MCCB should be with spreader link and phase barriers.					
		3 Phase, fully automatic Star Delta starter suitable for 45/50 hp Primary chilled water pumps.					
v		2 Nos. MCCB feeder as per following details/ specifications:					
		400 Amp 415 volts, 50 KA (Ics=Icu), TPN MCCB microprocessor based, with O/L, S/C & E/F protection.					
		Extended rotary operating mechanism with door interlock, defeat feature and padlock facility. MCCB should be with spreader link and phase barriers.					
		For Secondary chilled water pumps.					

Item No. 1	DSR/ NDSR 2	Description 3	Qty. 4	Unit 5	Rate in Rs (in Figure) 6	Rate in Rs. (in words) 7	Amount in Rs (in Figure) 8
vi.		2 Nos. MCCB feeder as per following details/ specifications:					
		250 Amp 415 volts, 50 KA (Ics=Icu), TPN MCCB microprocessor based, with O/L, S/C & E/F protection.					
		Extended rotary operating mechanism with door interlock, defeat feature and padlock facility. MCCB should be with spreader link and phase barriers.					
		For secondary hot water pumps					
vii.		3 Nos. MCCB feeder as per following details/ specifications:					
		100 Amp 415 volts, 50 KA FP MCCB with thermal magnetic release having variable current settings of O/L, S/C protection.					
		Extended rotary operating mechanism with door interlock, defeat feature and padlock facility. MCCB should be with spreader link and phase barriers.					
		3 Phase, fully automatic Star Delta starter suitable for 15 hp hot chilled water pumps					
viii.		6 Nos. MCCB feeder as per following details/ specifications: For Cooling Towers					
		63 Amp 415 volts, 50 KA FP MCCB with thermal magnetic release having variable current settings of O/L, S/C protection.					
		Extended rotary operating mechanism with door interlock, defeat feature and padlock facility. MCCB should be with spreader link and phase barriers.					
		3 Phase, fully automatic Star Delta starter 12.5 HP for cooling tower fans					
ix.		12 Nos. MCCB feeder as per following details/ specifications: For Cooling Towers					
		32 Amp 415 volts, 50 KA FP MCCB with thermal magnetic release having variable current settings of O/L, S/C protection.					
		Extended rotary operating mechanism with door interlock, defeat feature and padlock facility. MCCB should be with spreader link and phase barriers.					
		3 Phase, fully automatic DOL starter 5/7.5 HP for ventilation fans					
	NDSR	Complete panel as above	1	Panel			0.00
21.2		**STARTER PANEL - DOL / STAR DELTA STARTER**					
		Supply, installation, testing & commissioning of Fan Starter Panel with following details :					
		Each Starter Panel shall have :					
a.		14G CRCA Powder Coated panel enclosure with earthing studs & hinged locable doors. IP55 Protection, suitable for 415V, 3 Phase, 4 wire, 50Hz system.					
b.		Type-II co-ordination switchgear.					
c.		Incomer switch shall be TP MPCB of required rating & fault withstand capacity. MPCB shall be with overload & short circuit protection.					
d.		R,Y,B LED Type Phase indication lamps with control MCB's.					

Item No. 1	DSR/ NDSR 2	Description 3	Qty. 4	Unit 5	Rate in Rs (in Figure) 6	Rate in Rs. (in words) 7	Amount in Rs (in Figure) 8
e.		Auto / Manual Selector switch & ON & OFF Push buttons for manual operation & terminals for BMS wiring.					
f.		ON' Indication LED Type lamp with control MCB.					
g.		DOL Starter / Contactor for motors upto 7.5HP, with 2 NO + 2 NC Auxiliary contacts.					
h.		Star-Delta starter / contactors / timers for motors beyond 7.5HP, with 2 NO + 2 NC Auxiliary contacts.					
i.		All internal control & power wiring.					
j.		Voltage operated 'SPP' (Single Phasing Preventor) .					
k.		Cast resin CT's (3 Nos. for more than 5HP motors) & single CT for motors upto 5HP for metering purposes. CT's shall be of required class & burden.					
l.		Digital VA Meter .					
m.		Control terminals / linkage / interlocking with fire detection system & fire dampers, so that Fresh air Fan motor trips on receiving a fire signal & normal & smoke exhaust fans start on receiving a fire signal. Manual control shall also be possible through an override.					
		(Note: Power supply up to the each sub panel shall be in the scope of client/other agencies)					
21.2.1	NDSR	upto 3 HP DOL Starter	4	Nos.			0.00
21.2.2	NDSR	5 HP DOL Starter	25	Nos.			0.00
21.2.3	NDSR	7.5 HP DOL Starter	26	Nos.			0.00
21.2.4	NDSR	10 HP Star Delta Starter	11	Nos.			0.00
21.2.5	NDSR	12.5 HP Star Delta Starter	1	Nos.			0.00
21.2.6	NDSR	15 HP Star Delta Starter	8	Nos.			0.00
21.2.7	NDSR	20 HP Star Delta Starter	10	Nos.			0.00
22.0		**CABLING**					
		Supplying, laying, effecting proper connections, testing & commissioning of following size of 1.1 kv XLPE insulated aluminium conducting armoured cables as per IS 7096 laid underground/cable tray/on surface of wall/hume pipe etc. & termination with brass compression glands as required.					
22.1	NDSR	3.5Cx 300 sq.mm cable	50	Mtr			0.00
22.2	NDSR	3.5Cx 240 sq.mm cable	10	Mtr			0.00
22.3	NDSR	3.5C x 185 sq.mm cable	50	Mtr			0.00
22.4	NDSR	3.5C x 150 sq.mm cable	10	Mtr			0.00
22.5	NDSR	3.5C x 120 sq.mm cable	50	Mtr			0.00
22.6	NDSR	3.5C x 95 sq.mm cable	10	Mtr			0.00
22.7	NDSR	3.5C x 70 sq.mm cable	50	Mtr			0.00
22.8	NDSR	3.5C x 50 sq.mm cable	10	Mtr			0.00
22.9	NDSR	3.5C x 35 sq.mm cable	50	Mtr			0.00
22.10	NDSR	4C x 25 sq.mm Cable	10	Mtr			0.00
22.11	NDSR	4 C X 16 sq. mm. Cable	100	Mtr			0.00
22.12	NDSR	3 C X10 sq. mm. Cable	100	Mtr			0.00
22.13	NDSR	4 C X 6 sq. mm. Cable	100	Mtr			0.00
22.14	NDSR	4 C X 4 sq. mm. Cable	100	Mtr			0.00
22.15	NDSR	3C X 6 sq. mm. Cable	200	Mtr			0.00
22.16	NDSR	3C X 4 sq. mm. Cable	200	Mtr			0.00

Item No. 1	DSR/ NDSR 2	Description 3	Qty. 4	Unit 5	Rate in Rs (in Figure) 6	Rate in Rs. (in words) 7	Amount in Rs (in Figure) 8
23.0		**CABLE TRAYS**					
		Supply & installation of following sizes of perforated MS cable trays including horizontal & vertical bends, reducers, tees, cross members and other accessories as required and duly supported from the ceiling/wall/floor with MS suspenders/supports and including painting etc. as required					
23.1	NDSR	450 mm widthx50 mm deep x1.6 mmthickness	50	Mtr			0.00
23.2	NDSR	300 mm widthx50 mm deep x1.6 mmthickness	50	Mtr			0.00
23.3	NDSR	200 mm widthx50 mm deep x1.6 mmthickness	50	Mtr			0.00
23.4	NDSR	150 mm widthx50 mm deep x1.6 mmthickness	50	Mtr			0.00
23.5	NDSR	100 mm widthx50 mm deep x1.6 mmthickness	50	Mtr			0.00
24.0		**EARTHING**					
24.1	NDSR	Earth pits with GI earth plate of size 600mmx600mmx6mm thick including all accessories , down watering GI pipes 40mm dia and providing masonry enclosure with cover plate having interlocking arrangement and watering pipe etc. with charcoal of or coke and salt) complete as required	6	Set			0.00
24.2	NDSR	Providing & fixing GI earth strip 40mm x 6mm on surface or in recess for earth connections etc. as required	25	Mtr			0.00
24.3	NDSR	Providing and fixing GI earth strip on walls/ trenches complete as per specifications and as required.					
24.3.1	NDSR	50mmx 5mm	25	Mtr			0.00
24.3.2	NDSR	25mm x 5mm	25	Mtr			0.00
24.4		Providing and fixing earth wire of complete as per specifications as required.					
24.4.1	NDSR	6 SWG wire	50	Mtr			0.00
24.4.2	NDSR	8 SWG wire	50	Mtr			0.00
25.0		**CONTROL CABLING**					
		Supply, laying, effecting proper connections, testing & commissioning of 1.5 sq.mm. PVC insulated copper multicore cables					
25.1	NDSR	8 core cable	50	Mtr			0.00
25.2	NDSR	6 core cable	50	Mtr			0.00
25.3	NDSR	2 core cable	50	Mtr			0.00
		Total ELECTRICAL					**0.00**
		TOTAL FOR HVAC WORKS					**0.00**