

SUMMARY OF BOQ FOR HVAC WORKS				
Project :	JSW ACADEMIC BLOCK – NLSIU			
Date :	2/10/2025			
Version :	R0			
HVAC BOQ				
SUMMARY				
SL NO	DESCRIPTION	SUPPLY	INSTALLATION	TOTAL
A	VRF EQUIPMENT	0	0	₹0
B	DX SPLIT AC UNITS	0	0	₹0
C	AIR DISTRIBUTION WORKS	0	0	₹0
D	VENTILATION UNITS	0	0	₹0
E	VAV	0	0	₹0
F	ELECTRICAL WORKS	0	0	₹0
	GRAND TOTAL FOR ACMV WORKS EXCLUSIVE OF ALL DUTIES AND TAXES			₹0

BOQ FOR HVAC WORKS							
Project :		JSW ACADEMIC BLOCK – NLSIU					
Date :		2/10/2025					
Version :		R0					
VARIABLE REFRIGERANT FLOW SYSTEM							
Sl. No:	DESCRIPTION	UNIT	TOTAL QTY	RATE		AMOUNT	
				SUPPLY	INSTALLATION	SUPPLY	INSTALLATION
	BOQ Shall be read thoroughly by the Contractor before Bidding. All Technical Specifications shall be complied, ambiguities shall be raised before bidding.						
A	VARIABLE REFRIGERANT FLOW SYSTEM - COOLING ONLY TYPE						
1	VARIABLE REFRIGERANT FLOW SYSTEM - SIDE & TOP DISCHARGE TYPE ODU						
	The system shall be suitable for variable refrigerant volume / flow air conditioner consisting of one outdoor unit and multiple indoor units.						
	The outdoor units shall be of Inverter / digital scroll type capable of changing the rotating speed to follow variations in cooling load and shall be suitable for connecting multiple indoor units of different capacities & types as per the drawing and project requirements. The compressor shall be able to run at minimum 10% capacity as well.						
	The unit should be suitable for non-ozone depleting refrigerant R410A / R32. The refrigerant piping between farthest indoor units and outdoor unit shall be possible to extend up to 175m with maximum 50m level difference.						
	The unit shall be with non-ozone depleting refrigerant R410A / R32. The total refrigerant piping length (both liquid & gas pipe) shall be possible to extend up to 300m with maximum 50m level difference and also between the first indoor branch and the farthest indoor unit shall be possible to extend up to 40m.						
	Transportation, shifting, lifting, Installation, testing & commissioning of the below indoor units & Outdoor units with necessary mounting brackets & arrangements, pressure testing of the VRF system, vibration isolation pads, Refrigerant initial charge and after commissioning, electrical cable termination from breaker to ODU module etc., Testing and commissioning of VRF works shall be included.						
	The system shall be provisioned such that, even if the power supply to any Indoor unit is cut-off, the rest of the system shall be able to continue to function normally.						
	All components shall be mounted on welded steel base frame, structural steel profiles/panels made out of galvanized sheet steel, protected with primary coat & finished with epoxy paint. Grouting shall be considered for the condenser units Note : All ODU's & IDUs, refer drawings.						
	The vendor shall select all the units suitable for nominal capacity suitable for maximum outdoor temperature of 36 °C and suitable for indoor temperature as per the requirement. The selected equipments shall meet the minimum TR and CFM (as per the BOQ.) vendor should submit the selection of indoor and outdoor capacity as per temperature deration and piping deration with supporting engineering data sheet. without this calculation and datasheet, the TDS will not be accepted.						
	DLP for one year and two year warranty after commissioning shall be included as a part of costing						
	MS Outdoor unit stand for Outdoor units painted with two coats of non corrosive paint (black) & necessary supporting arrangements shall be included as a part of costing.						
	Costing shall be included for all the above items and any other necessary items necessary for successful completion of system.						
	Till 06 HP , Single Phase power supply shall be considered.						
	Outdoor Compressor & Condenser units - VRF Type (COP shall be more than 3.6 at AHRI -1230 condition of 36 °C air over condenser coil and should meet ECBC 2017 requirements) - Vendor shall submit the COP details of selected configuration of ODU while submitting the TDS for approval. The below mentioned capacities are without considering any deration. contractor shall select the equipment to give the below mentioned capacity after applying all type of derations.						
1.01	44 HP - Actual Capacity for Circuit 01 (TOP DISCHARGE TYPE ODU)	Nos.	1			-	-
1.02	24 HP - Actual Capacity for Circuit 02 (TOP DISCHARGE TYPE ODU)	Nos.	1			-	-
1.03	38 HP - Actual Capacity for Circuit 03 (TOP DISCHARGE TYPE ODU)	Nos.	1			-	-
1.04	24 HP - Actual Capacity for Circuit 04 (TOP DISCHARGE TYPE ODU)	Nos.	1			-	-
1.05	24 HP - Actual Capacity for Circuit 05 (TOP DISCHARGE TYPE ODU)	Nos.	1			-	-
1.06	18 HP - Actual Capacity for Basement TFA (TOP DISCHARGE TYPE ODU)	Nos.	1			-	-
1.07	10 HP - Actual Capacity for GF-TFA (TOP DISCHARGE TYPE ODU)	Nos.	1			-	-
1.08	20 HP - Actual Capacity for 1F-TFA (TOP DISCHARGE TYPE ODU)	Nos.	1			-	-
1.09	14 HP - Actual Capacity for 2F-TFA (TOP DISCHARGE TYPE ODU)	Nos.	1			-	-
1.10	14 HP - Actual Capacity for 3F-TFA (TOP DISCHARGE TYPE ODU)	Nos.	1			-	-
2	CEILING SUSPENDED CHILLED WATER TREATED FRESH AIR UNITS - VRF TYPE						
	Double skin type Ceiling suspended units complete with double skin (43±2 mm) insulated with CFC free polyurethane foam (PUF) panels of 42 Kg/cum density. The outer and inner panel thickness shall be 0.8 mm and 0.8 mm GI respectively. Outer skin shall be pre-coated G.I. sheet and internal skin shall be plain G.I. sheet suitable for VRF application . The unit shall be provided with plug fans, IE3 Motor , minimum 4 row cooling coil and drain pan with 15mm thick nitrile rubber insulation, inlet filter section with MERV-11 filters , drive set & guard, spring isolator to avoid transmission of vibration,etc. The noise of the unit shall not exceed more than 60 dBA at 1m distance from the unit and at maximum operating speed. The height of the unit shall not exceed 650mm. Additional FRP drain tray shall be considered for this units. Motor should be VFD Compatible. Unit should be rated for AC power input of 3-phase 415V, 50Hz. The unit shall be Eurovent / AHRI Certified. VFD Cost should not be included in this line item. Filter section to be provided with provision to install DP sensor for all individual filter section with separate frames for each filter. The filters shall be provisioned in a sliding base frame so that it can be accessed from only 1 side. Rear access will not be available.						
	The unit shall be provided with Direct driven plug fans, IE3 Motor, drive package, vibration Spring isolators to fans and motor to avoid transmission of vibration.						
	Filters Section shall be with 50mm thick panel type pre-filter of MERV-11 as part of CSU.						
	Cost shall be inclusive of non-cloth type canvas connection made of self extinguishing, moisture resistant flexible fabric to be provided between TFA outlet flange and the supply duct / plenum.						
	Spring isolators shall be used in the installation of the Ceiling suspended Units to ensure there is no transmission of vibration from the equipment to the building structure. The filters shall be provisioned in a sliding base frame so that it can be accessed from only 1 side. Rear access will not be available. Access to coil, fan section, filter etc., shall be from the same side only.						
	The unit shall be suitable for R410A / R32 refrigerant.						
2.01	13.5TR/3361 CFM -20MM ESP	Nos.	1			-	-
2.02	7.32TR/1830 CFM -20MM ESP	Nos.	1			-	-
2.03	16.3TR/4060 CFM -25MM ESP	Nos.	1			-	-
2.04	10.8TR/2688 CFM -20MM ESP	Nos.	1			-	-
2.05	10.8TR/2708 CFM -20MM ESP	Nos.	1			-	-
3	HI-WALL TYPE INDOOR UNITS - VRF TYPE						
	Hi Wall type Indoor unit suitable for R410A / R32 refrigerant. The unit shall have necessary filters, cooling coil, Electronic expansion valve, fan, multi speed fan motor, decorative panels, cordless remote controller with LCD Display etc., as per tender drawing and specification.						
	Note: The capacities prescribed below are heat transfer capacities. The selected equipment shall meet mentioned capacities and air flow requirements.						
	The units shall be suitable for input power supply of 1phase, 230volts, 50hz.						
3.1	1.5 TR / 500 CFM	Nos.	RO			-	-
3.2	2.0 TR / 650 CFM	Nos.	RO			-	-
4	4-WAY CASSETTE TYPE UNITS - VRF TYPE						
	Ceiling mounted 4way-Cassette type unit suitable for R410A / R32 refrigerant. The Cassette indoor unit shall have necessary filters, cooling coil, electronic expansion valve, fan, multi speed fan motor, inbuilt condensate drain pump of lift upto 2mtr, decorative panels, cordless remote controller with LCD Display etc., Quoted price shall include inbuilt drain pump as per tender drawing and specification.						
	The units shall have not less than 75mm dia provision for outdoor fresh air duct connection.						
	The units shall be suitable for input power supply of 1phase, 230volts, 50hz.						
4.1	0.8TR / 350 CFM	Nos.	RO			-	-
4.2	1.0 TR / 400 CFM	Nos.	RO			-	-
4.3	1.3 TR / 415 CFM	Nos.	RO			-	-
4.4	1.6 TR / 670 CFM	Nos.	RO			-	-
4.5	2.0 TR / 700 CFM	Nos.	2			-	-

5	CEILING MOUNTED HIGH STATIC DUCTABLE TYPE UNITS - VRF TYPE						
	Ceiling suspended HIGH STATIC ductable type unit with low noise, suitable for R410A / R32 refrigerant. The ductable indoor unit shall have necessary long life high quality filters, cooling coil, electronic expansion valve, fan, fan motor, inbuilt condensate drain pump, decorative panels, canvass connection, corded remote controller with thermostat, additional FRP drain tray shall be considered for this units.etc., Quoted price shall include inbuilt drain pump as per tender drawing and specification.						
	Quoted price shall include remote cabling of 2C x 1.0Sqmm between each IDU & its wired remote to be suitably laid in 1" PVC conduit.						
	The units shall be suitable for input power supply of 1phase, 230volts, 50hz.						
	The units shall be suitable for the external static pressure of 200 Pascals.						
5.1	4.0 TR / 1600 CFM	Nos	RO			-	-
5.2	5.5 TR / 2000 CFM	Nos	6			-	-
5.3	6.4 TR / 2400 CFM	Nos	11			-	-
6	CUSTOMIZED CEILING MOUNTED DUCTABLE TYPE UNITS - VRF TYPE						
	Double skin type Ceiling suspended units complete with double skin (43±2 mm) insulated with CFC free polyurethane foam (PUF) panels of 42 Kg/cum density. The outer and inner panel thickness shall be 0.8 mm and 0.8 mm GI respectively. Outer skin shall be precoated G.I. sheet and internal skin shall be plain G.I. sheet suitable for VRF application . The unit shall be provided with plug fans, IE3 Motor , minimum 4 row cooling coil and drain pan with 15mm thick nitrile rubber insulation, inlet filter section with MERV-11 filters , drive set & guard, spring isolator to avoid transmission of vibration,etc. The noise of the unit shall not exceed more than 60 dBA at 1m distance from the unit and at maximum operating speed. The height of the unit shall not exceed 650mm. Additional FRP drain tray shall be considered for this units. Motor should be VFD Compatible. Unit should be rated for AC power input of 3-phase 415V, 50Hz. The unit shall be Eurovent / AHRI Certified. VFD Cost should not be included in this line item. Filter section to be provided with provision to install DP sensor for all individual filter section with separate frames for each filter. The filters shall be provisioned in a sliding base frame so that it can be accessed from only 1 side. Rear access will not be available.						
	The unit shall be provided with Direct driven plug fans, IE3 Motor, drive package, vibration Spring isolators to fans and motor to avoid transmission of vibration.						
	Filters Section shall be with 50mm thick panel type pre-filter of MERV-11 as part of CSU.						
	Cost shall be inclusive of non-cloth type canvas connection made of self extinguishing, moisture resistant flexible fabric to be provided between CSU outlet flange and the supply duct / plenum.						
	Spring isolators shall be used in the installation of the Ceiling suspended Units to ensure there is no transmission of vibration from the equipment to the building structure. The filters shall be provisioned in a sliding base frame so that it can be accessed from only 1 side. Rear access will not be available. Access to coil, fan section, filter etc., shall be from the same side only.						
6.1	10 TR / 4200 CFM (30mm ESP)	Nos	1			0	0
6.2	12.5 TR / 4350 CFM (30mm ESP)	Nos	2			0	0
7	CONDENSATE DRAIN PUMP						
	Supply & Installation of condensate drain pump kit with anti-siphoning device with high level safety switch with appropriate tank capacity suitable for pumping water for a vertical head of 2M, minimum 10L/hr with necessary piping and valve support arrangement. This item shall be used for the removal of condensate water from the air conditioning indoor unit. Power cabling & termination to be considered in quote. Any other material required for effective functioning of the drain pump shall also be considered as part of this line item. Note: If the slope is not available as per site condition, then only this component shall be operated with prior approval from Engineer In charge.	Nos.	RO			-	-
8	COPPER REFRIGERANT PIPING						
	Hard drawn 18G copper refrigerant pipes with necessary fittings, extension kit and associated accessories. Refrigerant pipes shall be clamped to the tray horizontal supports with necessary protection against mechanical friction/insulation compression with tray supports and shall be clamped firmly with heat resistant gromets. Copper refrigerant pipes shall be insulated with 19 mm thick closed cell elastomeric tubular insulation material. The quoted rate shall be inclusive of the supporting arrangements.						
8.01	41.3 mm dia	Rmt.	80			-	-
8.02	34.9 mm dia	Rmt.	110			-	-
8.03	28.6 mm dia	Rmt.	275			-	-
8.04	22.2 mm dia	Rmt.	255			-	-
8.05	19.1 mm dia	Rmt.	260			-	-
8.06	15.9 mm dia	Rmt.	205			-	-
8.07	12.7 mm dia	Rmt.	85			-	-
8.08	9.5 mm dia	Rmt.	335			-	-
8.09	6.4 mm dia	Rmt.	RO			-	-
8.10	Necessary Ref joints, valves as per the schematic drawing. (1 LOT for entire VRF circuits)	Lot	17			-	-
9	INSULATED CONDENSATE DRAIN PIPES						
	Supply, installation, testing and commissioning of rigid uPVC piping complete with fittings, supports as per specifications and duly insulated with 9 mm thick closed cell nitrile rubber. Density of uPVC pipe shall not be less than 10 kg / m3						
9.1	25mm. Dia.	Rmt	200			-	-
9.2	32mm. Dia.	Rmt	480			-	-
9.3	40mm. Dia.	Rmt	30			-	-
9.3	50mm. Dia.	Rmt	RO			-	-
10	PERFORATED TYPE CABLE TRAY						
	Supply and installation of following sizes of perforated GI cable trays of 1.6mm thickness and 100mm high, including bends, tees & reducers and including all labour and materials, as per approved drawings, specifications of this tender and directions of Engineer-in-charge. The rate shall include bends, angles, Ts and all accessories complete with "C" Strut support and Supports Shall be provided at every 1000mm. The cost of supports to be included. Supports must be welded to a square true ceiling base plate with arc welding, the base plate must be fixed to the true ceiling with 04 nos. of anchor fasteners. Trays shall be With two runs of (25x6)mm GI Earth strip fixed to the cable tray sides. The cost of 2 run of GI Strip to be included in the cost of the cable tray. GI perforated type cable tray with plain top cover for laying of copper refrigerant pipes in false ceiling / raised floor and terrace with supports at 1m interval. Heat resistant gromets to be used to hold the copper pipes. Metal to metal contact should be eliminated. All bends, Elbows, Junction box, angles, Ts should be factory made only. Fabrication works like cutting / jointing not allowed at site.						
	For ceiling & exposed areas (To be considered with support also)						
	PLAIN TOP COVER (POWDER COATED) covered sheet should be considered for all exposed copper refrigerant pipes.						
10.1	100 mm (W) x 100 mm (D) x 1.6 mm (T)	RMT	100			-	-
10.2	150 mm (W) x 100 mm (D) x 1.6 mm (T)	RMT	300			-	-
10.3	200 mm (W) x 100 mm (D) x 1.6 mm (T)	RMT	200			-	-
10.4	300 mm (W) x 100 mm (D) x 1.6 mm (T)	RMT	50			-	-
10.5	300 mm (W) x 100 mm (D) x 1.6 mm (T) (with Top Cover)	RMT	100			-	-
11	VRF PLANT MANAGER						
	A multifunctional compact centralized controller shall be provided with the system. It shall be provided with backup power supply. In case of total power failure it should have built in memory for recollect the latest settings. 1 set for all ground floor VRF units, and each wing with 1 set of controller. VRF Plant manager should have built in Display.	Set	1			-	-
	It shall be able to control up to 64 groups (128 indoor units) with the following functions						
	a) Starting/stopping of Air-conditioners as a zone or group or individual unit.						
	b) Temperature settling for each indoor unit or zone.						
	c) Switching between temperature control modes, switching of fan speed and direction of airflow, enabling/disabling of individual remote controller operation.						
	d) Monitoring of operation status such as operation mode & temperature setting of individual indoor units, maintenance information, trouble shooting information.						
	e) Display of air conditioner operation history.						
	f) Daily management automation through yearly schedule function with possibility of various schedules.						
	g) It should able to communicate with BMS system with necessary hard ware & software of open protocol system ie., BACNet protocol.						

	h) Auto sequencing of the circuits. If there is any breakdown of any circuit, the stand-by circuit shall operate immediately.						
	The controller shall have wide screen user friendly display and can be wired by a non polar 2 wire transmission cable to a distance of 1 km. away from indoor unit.						
	Controller shall have fire alarm interlock with all the indoor units, to switch "OFF" in the event of fire through potential free contacts and shall be capable of receiving signals from Fire safety system.						
12	ELECTRICAL WORKS FOR VRF SYSTEM						
	MCB/MPCBs for individual ODUs, VRF Distribution Panels, power cables from feeders to ODUs to the individual ODUs and earthing for individual ODUS. Note: Power supply with isolater shall be provided at single point. Further distribution to respective ODUs with suitable size MCBs etc., shall be part of VRF system SITC. The enclosure for the MCB for individual ODU shall have IP65 enclosure, suitable for outdoor application.	Set	10			-	-
12.1	Electrical Power cable between the indoor unit and power socket with 3 Core, 1.5 sqmm , flexible copper cable, with 1 no. plug top for each IDU.	Rmt.	81			-	-
12.2	2C x 1.5 Sqmt PVC FRLS communication control cable between various indoor units and the outdoor units. Also, from ODU to plant manager.	Rmt	600			-	-
13	BIRD WIRE MESH						
	16G GI Bird wire mesh with duly painted with primer & enamel paint.	Sqmt.	2			-	-
14	M.S. STRUCTURAL WORKS						
	Supply and installation of MS Structures along with necessary accessories to locate AC Outdoor units. The Structures shall be painted with 1 coat of primer and 2 coats paint.	Kg	1,500			-	-
	TOTAL FOR SUPPLY & INSTALLATION					0	0
	TOTAL FOR VRF EQUIPMENT						0

BOQ FOR HVAC WORKS							
Project :		JSW ACADEMIC BLOCK – NLSIU					
Date :		2/10/2025					
Version :		R0					
DX SPLIT AC UNIT							
Sl. No:	DESCRIPTION	UNIT	TOTAL QTY	RATE		AMOUNT	
				SUPPLY	INSTALLATION	SUPPLY	INSTALLATION
	BOQ Shall be read thoroughly by the Contractor before Bidding. All Technical Specifications shall be complied, ambiguities shall be raised before bidding.						
B	DX SPLIT AC UNITS						
1	DX HI-WALL SPLIT UNITS - Inverter Type						
	The DX-Type Hi-wall Split units suitable for R410A / R 32 refrigerant with necessary outdoor unit. The Hi-wall indoor unit shall have necessary filters, cooling coil, expansion valve, fan, fan motor, decorative front panels, cordless remote controller with LCD Display, etc.						
	The units should be provided with necessary outdoor condensing unit. The outdoor unit shall have necessary condenser coil, fan, fan motor, Rotary / Scroll compressor, HP/LP cutouts, in-built electrical panel with necessary starter, relays, controls, etc., And the complete unit shall be suitable for outdoor application.						
	The units shall be suitable for input power supply of 1phase, 230volts, 50hz.						
	The cooling capacity mentioned here is nominal capacity to be delivered by the equipment suitable for total of 20m length of refrigerant copper piping between indoor and outdoor units inclusive of 15m of vertical upwards / downwards from the indoor unit, and at an outdoor temperature of 35 deg C. & Maldives Condition.						
	The unit shall be of High efficiency and shall be 5 star rating .						
	The units shall be provided with necessary indoor mounting supports, Outdoor mounting MS frame with 2 coat of Primer & 2 coat of enamel paint , fasteners, Anchor, vibration isolators etc.,						
	Installation & commissioning of below units with necessary mounting arrangements, pressure testing, Refrigerant charge, etc.,cost included for the same						
	Electrical Power & control cable between the indoor and outdoor unit with armored copper cable of suitable size along with the copper pipe routing. (Refer the drawings for the Qty)						
	Electrical Power cable between the outdoor units to respective power sockets, armoured flexible copper cable of suitable size. (Consider 5 Mtr / Equipment)						
	19 TO 22G Hard / Soft drawn Refrigerant piping circuit with 19mm thick nitrile rubber insulation. One refrigerant pipe circuit shall be inclusive of Suction gas & Liquid refrigerant pipe.						
	6.4 mm / 1/4" Inch with 19mm thick nitrile rubber insulation / as required for 1.0 / 1.5 TR unit	RMT	60			-	-
	12.7 mm / 1/2" Inch with 19mm thick nitrile rubber insulation / as required for 1.0 / 1.5 TR unit	RMT	60			-	-
	9.5 mm / 3/8" Inch with 19mm thick nitrile rubber insulation / as required for 2.0 TR unit	RMT	RO			-	-
	15.9 mm / 5/8" Inch with 19mm thick nitrile rubber insulation / as required for 2.0 TR unit	RMT	RO			-	-
1.1	1.0 TR / 300 CFM	Nos.	RO			-	-
1.2	1.5 TR / 450 CFM	Nos.	4			-	-
1.3	2.0 TR / 650 CFM	Nos.	RO			-	-
2	VOLTAGE STABILIZER						
	Supply,installation,testing and commissioning of wall mounted type, voltage stabilizer sized for Split AC (3 Star) units suitable for 1Ph, 230V. Input AC working range is 170V to 270V and output AC working voltage is 200V to 240V. safety features like under and over volt protection, phase reversal protection, surge and overload protection,initial time delay system, auto restart facility and Built In Thermal Overload Protection. Minimum warranty shall be 3 years. Necessary cables and accessories shall be considered for the completion of works	Nos.	4			-	-
3	CONDENSATE DRAIN PUMP						
	Supply & Installation of condensate drain pump kit with anti-siphoning device with high level safety switch with appropriate tank capacity suitable for pumping water for a vertical head of 2M, minimum 10L/hr with necessary piping and valve support arrangement. This item shall be used for the removal of condensate water from the air conditioning indoor unit. Power cabling & termination to be considered in quote. Any other material required for effective functioning of the drain pump shall also be considered as part of this line item. Note : If the slope is not available as per site condition, only then this component shall be operated / required.	Nos.	4			-	-
4	INSULATED CONDENSATE DRAIN PIPES						
	Supply,installation,testing and commissioning of rigid uPVC piping complete with fittings, supports as per specifications and duly insulated with 6 mm thick closed cell nitrile rubber. Density of uPVC pipe shall not be less than 10 kg / m3						
4.1	20mm. Dia.	RMT	RO			-	-
4.2	25mm. Dia.	RMT	60			-	-
4.3	32mm. Dia.	RMT	RO			-	-
5	PERFORATED TYPE CABLE TRAY						
	Supply and installation of following sizes of perforated GI cable trays of 1.6mm thickness and 100mm high, including bends, tees & reducers and including all labour and materials, as per approved drawings, specifications of this tender and directions of Engineer-in-charge. The rate shall include bends, angles, Ts and all accessories complete with "C" Strut support and Supports Shall be provided at every 1000mm. The cost of supports to be included. Supports must be welded to a square true ceiling base plate with arc welding, the base plate must be fixed to the true ceiling with 04 nos. of anchor fasteners. Trays shall be With two runs of (25x6)mm GI Earth strip fixed to the cable tray sides. The cost of 2 run of GI Strip to be included in the cost of the cable tray. GI perforated type cable tray with plain top cover for laying of copper refrigerant pipes in false ceiling / raised floor and terrace with supports at 1m interval. Heat resistant gromets to be used to hold the copper pipes. Metal to metal contact should be eliminated. All bends, Elbows, Junction box, angles, T's should be factory made only. Fabrication works like cutting / jointing not allowed at site.						
	For ceiling & exposed areas (To be considered with support also)						
	PLAIN TOP COVER (POWDER COATED) covered sheet should be considered for all exposed copper refrigerant pipes.						
5.1	100 mm (W) x 100 mm (D) x 1.6mm (T)	RMT	50			-	-
5.2	150 mm (W) x 100 mm (D) x 1.6mm (T)	RMT	RO			-	-
5.3	200 mm (W) x 100 mm (D) x 1.6mm (T)	RMT	RO			-	-
5.4	250 mm (W) x 100 mm (D) x 1.6mm (T)	RMT	RO			-	-
6	AUTO SEQUENTIAL CONTROL PANEL						
	Supply & installation of Auto sequential control panel for the DX Units. The panle should have the following features.						
	• A/C units shall be able to restart automatically after power failure/interruption.						
	• Automatic fault changeover						
	• Sequential changeover of operating units every 8 or 12 hours or as per Client schedule.						
	• Switch over to next machine or start both/all units if temperature exceeds the set point.						
	• The panel should be provided with potential free contat for fire & BMS integration.						
	• Should generate an alarm if the unit trips or the room temperature goes beyond the set point .						
	• Necessary control / power cables required						
	• Complete with Temperature sensors						
6.1	UPS room equipments - (1W+1S)	Nos.	1			-	-
6.2	Battery room equipments - (1W+1S)	Nos.	1			-	-
	TOTAL FOR SUPPLY & INSTALLATION					0	0
	TOTAL FOR DX EQUIPMENT						0

BOQ FOR HVAC WORKS							
Project :		JSW ACADEMIC BLOCK – NLSIU					
Date :		45698					
Version :		R0					
AIR DISTRIBUTION WORKS							
Sl. No.	DESCRIPTION	UNIT	TOTAL QTY	RATE		AMOUNT	
				SUPPLY	INSTALLATION	SUPPLY	INSTALLATION
	BOQ Shall be read thoroughly by the Contractor before Bidding. All Technical Specifications shall be compiled, ambiguities shall be raised before bidding.						
C	AIR DISTRIBUTION WORKS						
1	G.S.S DUCTING as per SMACNA Standards.						
	All ducting shall be of factory fabricated completely finished and transported to site in a boxed form (including the duct flange and the VAV (if present) transition pieces and Z pieces). GS sheet shall be Class VIII – with zinc coating of 120 gm / sqmt surface area. TDF type flanges with neoprene rubber gaskets of thickness to match the dimensions of the ducts shall be used for connecting two ducts. The cost of the duct shall include the threaded rod supports, angle flanges, anchor fastners, hot dipped galvanized bolts and nuts etc., The Duct to be manufactured and assembled as per SMACNA standard for Class-500pascals.						
	Air Balancing of each individual supply air outlet to within +10% or -5% of the design air quantity and tabulating the same in a form of report and also the final air balancing figures to be indicated against each measured outlets in the as built drawings. Balancing also includes balancing of return air, supply air and outdoor fresh air quantity. Air flow hoods to be used for measuring the air flow across the square diffusers.						
	Pressure Testing of Ducts - Pressure testing of sheet metal ducts with necessary components like semi-rigid flexible ducts, fans and the measuring kit. Pressure testing shall be carried out for complete air distribution system excluding flexible ducts, diffuser box, diffusers and grilles. Pressure testing shall be carried out prior to thermal insulation and as per SMACNA standards and approval shall be obtained from PMC and consultants.						
1.1	24G. Ducting	Sqmt.	1050			-	-
1.2	22G. Ducting	Sqmt.	230			-	-
1.3	20G. Ducting	Sqmt.	25			-	-
1.4	18G. Ducting	Sqmt.	RO			-	-
1.5	16G. Ducting	Sqmt.	RO			-	-
2	SITE FABRICATED G.S.S DUCTING						
	SITC of site fabricated ducts as per site condition.The cost of the duct shall include the, threaded rod supports, angle flanges, anchor fastners, hot dipped galvanized bolts and nuts etc.,						
2.1	24G. Ducting	Sqmt.	10			-	-
2.2	22G. Ducting	Sqmt.	RO			-	-
3	FIRE SEALANT FOR WALLS						
	Supply & installation of Acrylic fire stop sealant with minimum 2 hours fire rating when tested in accordance with UL 1479 standards, shall be used along periphery of ducts & chiller pipes without insulation passing through fire rated walls & floors made of concrete, masonry, metal, gypsum construction to provide up to 2 hours insulation & integrity when subject to the test conditions of UL 1479 standards. Product should be tested for mold resistance as determined by ASTM G21-96 & shall have a VOC content of approx. 75 g/l as per LEED 2009. All installations to be in full accordance with the manufacturer. The sealant should be tested in accordance with IEC 60068-2-57:1999-11 (Environmental Testing) as per Part 2-57: Test for Vibration-Time history method and VERTEQII for seismic zone 4. Product shall bear the UL & FM approval. Rate shall include the mineral wool backing material and other miscellaneous items etc.,. Make to be approved with consultant before procurement	Lot	1			-	-
4	ACOUSTIC INSULATION OF DUCTS						
	Class "1" type, Open cell elastomeric Acoustic insulation with density not less than 140 kg / m3. Insulation material to be fire retardant. Moisture resistant-joining tapes of 2 inches width with self adhesive to be supplied with the insulation material by the supplier. The material should be anti-microbial in nature & Low VOC.						
4.1	15 mm thick	Sqmt.	200			-	-
5	THERMAL INSULATION						
	Thermal insulation of the sheet metal duct with closed cell elastomeric insulation of Class 'O' material with density of 40 - 55 kg/cum as per the thickness mentioned below, with fire retardant adhesive and joints sealed with 3mm thick, 50mm wide nitrile rubber self adhesive tape.The material should be anti-microbial in nature & Low VOC.						
5.1	9 mm thick	Sqmt.	860			-	-
5.2	13 mm thick	Sqmt.	RO			-	-
6	UNDERDECK INSULATION WITH ELASTOMERIC INSULATION						
	Underdeck Insulation for the roof with closed cell elastomeric insulation -Class O type, material density of 40 - 60 kg/cum as per the thickness mentioned below, with fire retardant adhesive and joints sealed with 3mm thick nitrile rubber self adhesive tape. Adhesive used for the insulation shall be with Low - VOC content (as per GREEN building requirements). All joints sealed with 3mm thick, 75mm wide nitrile rubber self adhesive tape. The material should be anti-microbial in nature.						
6.1	25 mm thick insulation	Sqmt.	RO			-	-
7	GI - VOLUME CONTROL OPPOSED BLADE DAMPER						
	The volume control damper shall be of low leakage type with the outer shell constructed of 18G thick galvanized steel frame and the blade/Leaf with 18G thick GSS. And with necessary flanges for connection etc., as per specification. VCD quantity includes all types of duct.	Sqmt.	6			-	-
8	FIRE DAMPER WITH OPPOSED BLADE (Fusible Link type)- Extended Sleeve type - with 450 mm sleeve						
	The Fire damper as per UL 555, outer shell constructed with 1.6mm thick galvanized steel frame and the blade/Leaf with 1.6mm thick GSS. And with necessary flanges for connection as per specifications and drawings. The damper shall be of 180 min fire rating. The quoted rate shall include cost for the Fusible Link & spring mechanism, the damper shall be held open by a replaceable fusible link rated at 74 deg C.	Sqmt.	1			-	-
9	GRILLS - AI.						
	The supply & installation of higher grade Aluminum Extruded powder coated grilles with blade deflection of 0 & 15 deg. The grilles shall be powder coated by RAL color as approved by the architect.	Sqmt.	40			-	-
10	COLLAR DAMPER - OPPOSED BLADE TYPE						
	The collar damper shall be constructed out of extruded aluminum alloy with multiple blade of oppose blade type. Shall be used for the supply air diffuser & grilles as per the drawings & specifications.	Sqmt.	17			-	-
11	LOUVERS - AI.						
	High grade aluminum extruded Louvers for Fresh air intake & Exhaust air exit at outer wall of ventilation shafts at ground floor. The louver shall be of powder coated finish. The louver shall be with 45 deg deflection and shall prevent rain water entry through the louvers.additional aluminium frame and supports required to fix the louvers shall be considered in the quote. Mosquito mesh also to be considered under this line item only.	Sqmt.	8			-	-
12	EXHAUST VALVE - AI.						
	Exhaust valves constructed from steel spinning with powder coated finish. The valve should provided high initial resistance with wide throttling capability to offset the high system resistances. And finished with powder coating.						
	Air Balancing of each individual exhaust disc valve to within +10% or -5% of the design air quantity and tabulating the same in a form of report and also the final air balancing figures to be indicated against each measured outlets in the as built drawings.						
12.1	Neck size: 150mm dia.	Nos.	78			-	-
13	ROUND FLEXIBLE DUCTS WITH INSULATION.						
	Flexible ducting shall be manufactured from corrugated roll strip of grade 3003 aluminium, constructed with 4 ply lock seam to form a continuous flexible spiral duct. All flexible supply air shall be of the plain (i.e. unperforated) factory insulated type. Insulation shall consist of fiber glass blanket 25mm thick with minimum density of 16 kg/m³. The outer insulation jacket vapor barrier shall be made of fiber glass reinforced metalized polyester film laminated with aluminum foil as per the technical specifications.. There shall be no joints in flexible ducting used to connect the rigid ductwork with the Terminal box diffuser. It shall be one length only. Although flexible duct are capable of following an indirect route, the runs shall be as short and straight as possible in order to minimize pressure losses and noise generation. The duct shall be stretched to smooth out internal corrugations without unduly applying strain and long radius bends shall be used where possible.						
	75 mm Dia.	Rmt	RO			-	-
	100 mm Dia.	Rmt	RO			-	-
	150 mm Dia.	Rmt	RO			-	-
	200mm Dia.	Rmt	RO			-	-
	250mm Dia.	Rmt	80			-	-
	300mm Dia.	Rmt	50			-	-
14	SPIGOTS WITH BUTTERFLY DAMPER - CIRCULAR - SINGLE FLAP-GI						
	The Spigots with butterfly damper should constructed with not less than 0.8mm thick galvanized steel sheet, with single flap, necessary stopper, flanges for fastening on to the duct surface and with grooves for clamping the flexible ducts securely.						
14.1	150 mm Dia.	Nos.	RO			-	-
14.2	200 mm Dia.	Nos.	RO			-	-
14.3	250 mm Dia.	Nos.	48			-	-
14.4	300 mm Dia.	Nos.	28			-	-
15	SQUARE DIFFUSER - AI. (Supply)						

	The diffuser shall be of removable core type and constructed with high grade 20G aluminum extruded alloy and with powder coated finish (with collar damper). All diffusers shall have a continuous square neck of minimum 32mm height suitable for fixing spill air box.						
	All Supply air diffusers shall supported to the true ceiling with the chain.						
	Neck size: 225 x 225mm., Outer size: 595 x 595mm Standard	Nos.	RO			-	-
	Neck size: 375 x 375mm., Outer size: 595 x 595mm Standard	Nos.	RO			-	-
	Neck size: 450 x 450mm., Outer size: 595 x 595mm Standard	Nos.	28			-	-
	Neck size: 525 x 525mm., Outer size: 595 x 595mm Standard	Nos.	RO			-	-
16	SQUARE DIFFUSER - Al. (Return)						
	The diffuser shall be of removable core type and constructed with high grade 20G aluminum extruded alloy and with powder coated finish (without collar damper). All diffusers shall have a continuous square neck of minimum 32mm height suitable for supporting to true ceiling						
	All return air diffusers shall supported to the true ceiling with the chain.						
	Neck size: 225 x 225mm., Outer size: 595 x 595mm Standard	Nos.	RO			-	-
	Neck size: 375 x 375mm., Outer size: 595 x 595mm Standard	Nos.	RO			-	-
	Neck size: 450 x 450mm., Outer size: 595 x 595mm Standard	Nos.	28			-	-
	Neck size: 525 x 525mm., Outer size: 595 x 595mm Standard	Nos.	RO			-	-
17	SPILL AIR PLENUM BOX.						
	The supply & installation of FACTORY FABRICATED spill air boxes made out of 0.8mm thick GI sheet with necessary spigot connection for fixing flexible duct and suitable collar for connecting to various neck diffuser / slot diffuser. <u>The box should be internally insulated with 10mm thick open cell nitrile rubber of class "I" material.</u> The box size shall be as mentioned below. The cost shall be inclusive of necessary chain support						
	Box size of 300x300x400 mm and equivalent required rectangular sizes. (For 225x225 neck size)	Nos.	RO			-	-
	Box size of 375x375x400 mm and equivalent required rectangular sizes. (For 300x300 neck size)	Nos.	RO			-	-
	Box size of 450x450x400 mm and equivalent required rectangular sizes. (For 375x375 neck size)	Nos.	28			-	-
	Box size of 525x525x400 mm and equivalent required rectangular sizes. (For 450x450 neck size)	Nos.	RO			-	-
18	DUCT STRIP HEATER						
	Supply testing, commissioning & installation of Electric Duct Heater Box comprising of tubular heaters installed on GI Box complete, duly insulated with electrical panel comprising of contactors, fuses, Hi-Temperature, Thermostat, Airstat, Airflow switch						
	3 Kw = 1.5 Kw x 2 No's of heater bank.	Nos.	RO			-	-
	4.5 Kw = 1.5 Kw x 3 No's of heater bank.	Nos.	2			-	-
19	ASSOCIATED CIVIL WORKS						
	HVAC related all kind of civil works including grouting, pedestals, all leads & lifts, scaffolding, curing, chipping, filling, opening of wall, making sleeves etc. This line item excludes the works related to individual flat units.	Lot	1			-	-
20	IAQ sensor						
	Supply & installation of UL/CE listed Duct Mounted mounted IAQ sensor without Display with all necessary accessories.. The sensor shall be mounted on AHU common return duct/path. The sensor shall measure & display below IAQ parameters 1. Zone Temperature 2. Zone Humidity 3. Zone Co2 4. PM2.5 & PM10 5. TVOC 6. Formaldehyde(Optional) The sensor shall provide the output on Modbus/BACnet-RS485 output suitable with BMS Integration. The scope shall include necessary accessories for power & installed	Nos.	14			-	-
	TOTAL FOR SUPPLY & INSTALLATION					0	0
	TOTAL FOR AIR DISTRIBUTION WORKS						0

BOQ FOR HVAC WORKS							
Project :	JSW ACADEMIC BLOCK – NLSIU						
Date :	45698						
Version :	R0						
VENTILATION UNITS							
Sl. No:	DESCRIPTION	UNIT	TOTAL QTY	RATE		AMOUNT	
				SUPPLY	INSTALLATION	SUPPLY	INSTALLATION
	BOQ Shall be read thoroughly by the Contractor before Bidding. All Technical Specifications shall be complied, ambiguities shall be raised before bidding.						
D	VENTILATION UNITS						
1	RECTANGULAR INLINE EXHAUST FAN						
	The supply & installation of Rectangular duct inline fan with all accessories like fan, motor, flanges etc., The motor shall be with IP44 protection, non-canvass type fire retardant flexible connections. The motor should be of class 'F' insulation suitable for operating at 1phase, 230V, 50hz power supply. The below capacities are for actual operational requirements and the contractor should select fans which can deliver 10% additional airflow as a buffer by default. (Suitable 3Metre power cable to be considered)						
1.1	850 CFM, 15 mm wc. TSP	Nos.	6			-	-
1.2	1150 CFM, 15 mm wc. TSP (with explosion proof motor, Class H insulation)	Nos.	1			-	-
1.3	1200 CFM, 15 mm wc. TSP - Ele room exhaust	Nos.	1			-	-
1.4	1000 CFM, 15 mm wc. TSP - Ele Room fresh air fan with Pre-filter of 20 Micron	Nos.	1			-	-
2	WALL MOUNTED TYPE PROPELLER EXHAUST AIR FANS						
	The supply & installation of wall mountable propeller inline fan with all accessories like fan, motor, mounting frame, duct sleeve, gravity louvre, protection guarads,BDD, etc,. The motor should be of IP54, class 'F' insulation suitable for 1phase, 230V, 50hz power supply . (Suitable 3Metre power cable to be considered)						
2.1	150 CFM, 5mmwg ESP	Nos.	10			-	-
3	CABINET TYPE FRESH AIR FAN UNITS						
	The Double skin ceiling suspended Cabinet type fan unit with 23±2mm thick PUF sandwiched insulated panel,CFC free polyurethane foam (PUF) panels of 40 Kg/cum density.Sandwiched between 0.6 mm thick G.I. Sheets. Outer skin shall be pre coated G.I. sheet and internal skin shall be plain G.I. Sheet with DIDW centrifugal fan with Backward curved aerofoil impeller, MERV 11 filter, IE-3 Motor, Pulleys, Belts & Belt guard, drive sets, base frame, spring mounts, Limit switches, Marine lamp, Inspection door and all necessary accessories.						
	The unit shall be suitable for indoor application with necessary supports, MS channels & threaded rods etc. The unit shall have all specifications mentioned above for indoor application type unit.						
	The Motor shall be of TEFC, IP-55 protection, Class 'F' insulation, IE-3 motors, suitable for 3 phase, 415 volts, 50 hz power supply, Power cables and earthing cables from panel to equipment shall be considered as per panel location						
	Noise level shall be less than 60Dba from 1.5 Mtr distance at all directions.						
	20 micron washable filters shall be considered for Fresh air fans and cost included for the same						
3.1	400 CFM - 25 mm TSP	Nos.	1			-	-
4	TUBE AXIAL FANS FOR PRESSURIZATION						
	Long cased Smoke spill Tube / vane Axial fan with AMCA certification (For AIR, SOUND Performance) The Long casing shall comprise of adjustable blade angles to deliver the design air quantity. The motor shall be suitable for ventilation application. The axial fan assembly shall be housed in a casing made of Mild Steel with enamel painted, adjustable pitch die cast aluminium impeller (Hub and blades) and IE-2 Motor rated & suitable for 415V/3Ph/ 50Hz AC supply. Fan position shall be as per the tender drawings. The sound pressure levels of the fan shall not be exceed 70 dBA at 1.5M distance located within tower area. Necessary sound attenuators shall be considered to achieve the above sound pressure levels.						
	Supply of Fan Accessories: Mounting Cleats, Inlet Screen, Spring type vibration Isolators, Flexible connection at outlet & Grouting Frame.						
	Supply and installation of MS Structural along with chequre plate for fans shall be included.						
	dB level should be less than 75 within 1.5 m radius for fans located in tower area. If beyond 75dB consider sound attenuator to reduce noise level.cost shall be included for the same						
4.1	8,000 CFM - 25 mm WC TSP	Nos.	2			-	-
	TOTAL FOR SUPPLY & INSTALLATION					0	0
	TOTAL FOR VENTILATION UNITS					0	0

BOQ HVAC WORKS							
Project :		JSW ACADEMIC BLOCK – NLSIU					
Date :		45698					
Version :		R0					
BILL OF MATERIALS FOR VAV WORKS							
Sl. No:	DESCRIPTION	UNIT	Qty	RATE		AMOUNT	
				SUPPLY	INSTALLATION	SUPPLY	INSTALLATION
	Supply, installation, testing, balancing, commissioning and 36 months warranty (including Parts and Labour) from the date of acceptance by Consultants,PMC & Client of the following HVAC components for the above mentioned project.						
E	VAV WORKS						
1	VAV - Pressure independent type Variable Air Volume						
	Pressure independent type Variable Air Volume Units fabricated out of heavy gauge steel of thickness not less than 22G, mechanically sealed with gasket & leak resistance construction and provision for easy access / removal of all internal parts. For the flat oval VAV boxes, matching coupling joints shall be made of 18G. Both supply & discharge shall be suitable for duct connections.						
	Independent VAV Controller with inbuilt pressure sensor and precise cross flow sensors or velocity probes to be supplied. The VAV shall be capable of accepting two Analog parameter from temperature sensors and Occupancy Sensor (for all close cabins) & shall communicate through a network controller to a PC/Laptop. In the event of communication/network failure the VAV shall function on standalone mode.						
	All VAV boxes shall be supplied with all internal attenuation treatment and acoustical damped casing necessary to achieve the required noise criteria.						
	A suitable device shall be provided for the field adjustment of minimum / maximum air flow. All boxes shall be initially factory set at minimum air quantity of 20% to 120% of the design requirements. Under shut-off conditions, the VAV boxes shall not have air leakage more than 20% of the maximum air quantity.						
	VAV Unit shall be ceiling suspended with hanger brackets & vibration isolators.						
	All accessories listed under specifications should be considered for pricing VAVs						
	Direct Output temperature sensor comprising of high quality thermistor or platinum sensing element should be supplied with VAVs. All thermostat shall be without an adjustable knob, the set point shall be varied through web browser. All thermostats shall be located on the wall at 1200 to 1600mm from FFL. Sample of the thermostats shall be submitted for approval from consultants and architects prior to ordering.						
	The look of the sensor should be rectangular in shape. Projection of the sensor should not exceed 30 mm .						
	Necessary cabling between thermostat & VAV Box (approx 15 mtr / Sensor) in a 19 mm dia PVC Conduit should be considered under the scope of work. Plug top with Power Cord of 5m length should also be part of scope						
	The VAV Supplier shall demonstrate BACnet output to BMS contractor for sucessful integration.						
	DLP for 3 years after commissioning shall be included						
	All VAV unit to be selected to perform for 120% to 20% of design capacity of air flow given below with provision for field setting adjustment as required. VAV shall be AHRI certified and shall meet the requirements of AHRI 880.						
	Supervisory controller required shall also be integral scope of VAV/CAV supply.						
	Rectangular VAV Unit shall be of the following sizes:						
	Supply of the 450 cfm Capacity VAV (0-450)	Nos	3			-	-
	Supply of the 800 cfm Capacity VAV (450-800)	Nos	RO			-	-
	Supply of the 1350 cfm Capacity VAV (800-1350)	Nos	RO			-	-
	Supply of the 2000 cfm Capacity VAV (1350-2000)	Nos	8			-	-
	Supply of the 3000 cfm Capacity VAV (2000-3000)	Nos	RO			-	-
	Supply of the 4000 cfm Capacity VAV (3000-4000)	Nos	1			-	-
	Work station area thermostat - without set point adjuster and without display - Ceiling mounted	Nos	RO			-	-
	Cabin area thermostat - with set point adjuster and with display. Wall mounted.	Nos	RO			-	-
	CO2 Sensor for Fresh air VAV modulation	Nos	12			-	-
	Cabin area thermostat - with set point adjuster & CO2 Monitoring and with display. Wall mounted.	Nos	RO			-	-
	SITC of Necessary Control cable as per OEM recommendation	Rmt	300			-	-
	SITC of 19mm PVC conduit. All the communication & control cable between VAV/CAV system & Supervisory controller to be provided in 19mm PVC conduit.	Rmt	300			-	-
	All necessary Software & Hardware, Interface or integrator with open protocol like Native BACnet/IP suitable for BMS connectivity for control & monitoring to be provided. Total no. of network controller shall be based on manufacturer requirement. 1 network controller/router shall be capable of intergrating minimum 30 VAV/CAV boxes. No of controller shall be selected as per the number of vav boxes.	Lot	2			-	-
	TOTAL					0	0
	GRAND TOTAL					0	0

BOQ HVAC WORKS							
Project : JSW ACADEMIC BLOCK – NLSIU							
Date : 45698							
Version : R0							
BILL OF MATERIALS FOR ELECTRICAL WORKS							
Sl. No.	DESCRIPTION	UNIT	Qty	RATE		AMOUNT	
				SUPPLY	INSTALLATION	SUPPLY	INSTALLATION
	Supply, installation, testing, balancing, commissioning and 36 months warranty (including Parts and Labour) from the date of acceptance by Consultants,PMC & Client of the following HVAC components for the above mentioned project.						
F	ELECTRICAL WORKS						
1	VARIABLE FREQUENCY DRIVE STARTER PANEL						
	The Electrical starter panel shall comprise incoming MPCB, VFD, by-pass starters with all type-2 contactors , relays, single phase prevention, voltage imbalance protection, phase indicators with key switch, ON / OFF / TRIP indicators, Auto-OFF-Manual selector switch, Earth leakage relays. The panels shall be with necessary relays and potential free contacts required for complete control						
	The starter panel shall have necessary potential free NO/NC contacts for integrating with the fire alarm panel. On receiving signal from the fire panel, the fan shall trip automatically.						
	The Panel shall be of IP 65 protection for outdoor application and IP 54 for indoor, with by pass starter arrangement.Based on panel location IP rating to be selected For up to 5.5 KW motor the starter / by-pass starter shall be of DOL type and for motors of 7.5 KW and above Star-Delta Starter shall be provided. The construction of the electrical panel casing shall be with 2mm thick GI sheet, powder coated with Siemens grey colour. The panel shall have access door, Gland plate, supporting frames for mounting etc.,panel shall be located inside kitchen and push button station at terrace						
	The variable frequency drive (VFD) shall be supplied with IP 21 protection, digital display and with necessary active harmonic filter to prevent the injection of harmonics into the electrical system. The VFD shall be capable of regulating the speed of the fan from 120 % to 20% of rated fan speed at the specified rated flow & static. The VFD capacity shall be as per the actual motor selection of the fan. VFD shall have necessary in-built capacitors for power factor corrections to achieve 0.95 as power factor.						
	VFD bypass starter panel of capacity as mentioned in Equipment Schedule						
	0.55 KW (For cabinet type Fresh air Fan)	Nos.	1			-	-
	0.75 KW (For TFA)	Nos.	1			-	-
	1.1 KW (For TFA)	Nos.	3			-	-
	1.5 KW (For TFA)	Nos.	1			-	-
	2.2 KW (For Customized CSU)	Nos.	3			-	-
	3.7 KW	Nos.	RO			-	-
	5.5 KW	Nos.	RO			-	-
	7.5 KW	Nos.	RO			-	-
	9.3 KW	Nos.	RO			-	-
	11 KW	Nos.	RO			-	-
2	STARTER PANEL - STAR DELTA						
	Star delta starter panel with Outer panel, MPCB, contactors, Relays, phase indicators with key switch, ON, OFF push button switch, ON,OFF, TRIP indicators, Digital Ammeter & Voltmeter with selector switches, Auto-Off-Manual selector switch, etc.,						
	The Panel shall be with IP 54 protection. The construction of casing shall be with 1.6mm thick CRCA sheet steel powder coated with Siemens grey. And shall be provided with necessary door, Gland plate, supporting plate, etc.,						
	The Technical Specification of the starter panel with wiring diagram shall be provided for Consultant concurrence before procurement.						
	Starter panel with A/M switch and potential free contacts for BMS control required. TPN MCB to be provided near the unit. Starter panel shall be compatible to integrate with the fire alarm panel such that the power is supplied automatically on receiving fire signal.						
	Equipment schedule shall be referred for Panel ratings						
	5.5 KW	Nos.	RO			-	-
	7.5 KW	Nos.	RO			-	-
	9.3 KW	Nos.	RO			-	-
	11 KW	Nos.	RO			-	-
	15 KW	Nos.	RO			-	-
	22 KW	Nos.	RO			-	-
3	DOL STARTER PANEL						
	DOL starter panel with Outer panel, MPCB, contactors, Relays, phase indicators with key switch, ON, OFF push button switch, ON,OFF, TRIP indicators, Digital Ammeter & Voltmeter with selector switches, Auto-Off-Manual selector switch, etc.,						
	The Panel shall be of IP 65 protection for outdoor application and IP 54 for indoor, with by pass starter arrangement.Based on panel location IP rating to be selected The construction of casing shall be with 1.6mm thick CRCA sheet steel powder coated with Siemens grey. And shall be provided with necessary door, Gland plate, supporting plate, etc.,						
	The Technical Specification of the starter panel with wiring diagram shall be provided for Consultant concurrence before procurement.						
	Starter panel with A/M switch and potential free contacts for BMS control required. TPN MCB to be provided near the unit. Starter panel shall be compatible to integrate with the fire alarm panel such that the power is supplied automatically on receiving fire signal.						
	Equipment schedule shall be referred for Panel ratings						
	0.55 KW	Nos.	RO			-	-
	0.75 KW	Nos.	RO			-	-
	1.1 KW	Nos.	RO			-	-
	1.5 KW	Nos.	RO			-	-
	2.2 KW. (For Tube Axial Pressurization fan)	Nos.	5			-	-
	3.7 KW	Nos.	RO			-	-
	4 KW	Nos.	RO			-	-
	5.5 KW	Nos.	RO			-	-
	7.5 KW	Nos.	RO			-	-
4	ELECTRICAL WORKS						
	Supply, laying, end termination, testing and commissioning of following sizes of 1100V Steel/Aluminium and Wire/Strip armoured, unarmoured, sheathed Copper conductor cables of approved make. End termination of cables using brass type cable glands single / double compression with copper lugs.Suitable earthing for the panel and equipment shall be provided and cost shall be included for the same						
	Note : a) Hydraulic crimping tool shall be used for making the end terminations. b) Single compression glands - up to 150 sq.mm. c) Double compression glands for sizes > 150 sq.mm shall be used. d) Cable identification shall be made vide details furnished in single line						
	4C x 70 Sq.mm Al	Rmt	RO			-	-
	Cable End Termination	Nos.	RO			-	-
	4C x 25 Sq.mm	Rmt	RO			-	-
	Cable End Termination	Nos.	RO			-	-
	4C x 16 Sq.mm	Rmt	RO			-	-
	Cable End Termination	Nos.	RO			-	-
	4C x 10 Sq.mm	Rmt	RO			-	-
	Cable End Termination	Nos.	RO			-	-
	4C x 6 Sq.mm	Rmt	RO			-	-
	Cable End Termination	Nos.	RO			-	-
	4C x 4 Sq.mm	Rmt	RO			-	-
	Cable End Termination	Nos.	RO			-	-
	4C x 2.5 Sq.mm-from kitchen fan to push button staion.	Rmt	RO			-	-
	Cable End Termination	Nos.	RO			-	-
	4C x 1.5 Sq.mm-	Rmt	RO			-	-
	Cable End Termination	Nos.	RO			-	-
	3C x 35 Sq.mm	Rmt	RO			-	-
	Cable End Termination	Nos.	RO			-	-
	3C x 25 Sq.mm Al	Rmt	RO			-	-

	Cable End Termination	Nos.	RO			-	-
	3C x 16 Sq.mm Al	Rmt	RO			-	-
	Cable End Termination	Nos.	RO			-	-
	3C x 10 Sq.mm Cu	Rmt	RO			-	-
	Cable End Termination	Nos.	RO			-	-
	3C x 6 Sq.mm Cu	Rmt	RO			-	-
	Cable End Termination	Nos.	RO			-	-
	3C x 6 Sq.mm Al	Rmt	RO			-	-
	Cable End Termination	Nos.	RO			-	-
	3C x 4 Sq.mm Al	Rmt	RO			-	-
	Cable End Termination	Nos.	RO			-	-
	3C x 4 Sq.mm Al	Rmt	RO			-	-
	Cable End Termination	Nos.	RO			-	-
	3C x 2.5 Sq.mm Cu	Rmt	240			-	-
	Cable End Termination	Nos.	24			-	-
5	Ladder type Cable tray(GI)						
	Supply, fabrication, installation, testing and commissioning of following type hot dipped galvanised double bended cable trays from 1.6mm thick GI sheets continuously connected including horizontal and vertical bends, reducers, tees and other accessories and duly suspended/ Mounted from the ceiling / wall supported by "L" bracket made out of GI "C" channel of suitable size from reputed manufacturer. complete as per specifications, as required.						
	Note: Installation charges shall includes the necessary hardware viz, anchor fasteners, slotted C channel supports. a) Support at intervals of 1000mm b) Down rod/vertical support as per site conditions approved by project manager c) Slotted channel to suit width of the tray d) Spring and plate washers with locknuts (hot dip galvanised).						
	50mm (W) x 50mm (D) x 1.6mm (T)	Rmt.	RO			-	-
	100mm (W) x 50mm (D) x 1.6mm (T)	Rmt.	100			-	-
	150mm (W) x 50mm (D) x 1.6mm (T)	Rmt.	180			-	-
	300mm (W) x 50mm (D) x 1.6mm (T)	Rmt.	RO			-	-
6	Supply & Installation of GI wires for earthing and to be run with the power cable						
	12 SWG GI wire	Rmt	RO			-	-
	8 SWG GI wire	Rmt	180			-	-
	25 x 3 mm width G.I	Rmt	RO			-	-
	Total					-	-
	GRAND TOTAL						₹0