

**BILL OF QUANTITIES :**  
**SUB : HVAC SYSTEM FOR NIT-TIIR BUILDING AT ROURKELA**

S.NO	DESCRIPTION	UNIT	QTY		
				UNIT RATE-Rs.	AMOUNT-Rs.
1.0	<p><b>PACKAGED WATER-COOLED SCREW CHILLERS WITH VFD :</b>  Supply of Factory assembled and factory tested packaged WATER-COOLED SCREW CHILLER with VARIABLE FREQUENCY DRIVE complete with multiple Semi-Hermetic Screw compressor, factory insulated (19 mm closed cell elastomeric ) shell and tube evaporator , Water-cooled shell and tube condenser ,interconnecting copper piping, power wiring, control wiring, earthing , Power isolators / Disconnect switch and capacitors , all electricals to be of IP55 , microprocessor control panel with pre-wired automatic and safety controls and display module, full charge of R-134a refrigerant and oil, Companion flanges/ Grooved Victaulic couplings for pipe connections, Controls comprising thermostatic expansion valve, solenoid valve, Differential Pressure switch in Evaporator &amp; condenser , HP/ LP cutout, cooling and antifreeze thermostats etc, accessories like oil heater, refrigerant drier with isolating valves, liquid moisture indicator, strainer, safety relief valves, purge valve, refrigerant service valves and NRV at discharge. The machine shall be mounted on welded steel base frame protected with primary coat &amp; finished with acrylic paint , with anti vibration cushy foot mounts. It shall be possible to operate the chiller with one circuit only. Each chiller unit shall be provided with a single point power supply arrangement.</p>	NOS	2.00		

	The unit controller shall be compatible with Chiller Plant Manager operation on an Open Protocol communication card via a factory-installed communication module.				
	Necessary Computer selection with Model / catalogues to be submitted with quote for evaluation.				

	<b>Operating Parameters :</b>				
	Nominal Capacity : 200 TR				
	Operating Refrigerant : R-134a				
	Chilled Water Inlet Temperature : 12.55 Deg C				
	Chilled Water Outlet Temperature : 6.67 Deg C				
	Chilled Water flow Rate : 1817 LPM				
	Chiller fouling factor : 0.0005 FPS unit				
	Chiller water Pressure drop : not exceeding 5 m				
	Condenser Water Inlet Temperature : 32 Deg C				
	Condenser Water Outlet Temperature : 37 Deg C				
	Condenser fouling factor : 0.001 FPS unit				
	Condenser Water flow Rate : 2650 LPM				
	Condenser water Pressure drop : not exceeding 5 m				
	Electrical power supply: 415 V +/- 10 % , 50 Hz, 3 ph.				
	Design Wet Bulb temperature : 25.6 Deg C				
	IKW/TR and IPLV COP should be confirming to ASHRAE standard 90.1-2010				
	Test Procedure : AHRI standard 550-590-2011				
	DP Switch Required				
	MCCB Required for cable termination				
1.1	Port clearance, Inland transportation to site, Lifting and Installation of chillers on concrete pedestals , Testing, Commissioning and Handing over of the above Water Cooled Screw Chiller system.	NOS	2.00		

2.0	<p><b>FRP COOLING TOWER :</b> Supply of FRP Cooling tower suitable for 756000 Kcal / hr heat rejection capacity with FRP Water basin, PVC Filling with integral louvers and drift eliminators complete with hot water basin either fitted with spray nozzles or having self rotating sprinklers, statically and dynamically balanced axial flow type fan-direct driven or driven through reduction gear box with TEFC induction motor (IE2) efficiency) VFD Controlled, suction screen, makeup quick fill arrangement, overflow and drain connections with necessary valves and suitable inspection SS ladder, access arrangement for cooling tower interior, supporting structure, anti-vibration mountings etc. complete as per specifications and as reqd. The Cooling tower should be CTI certified. ( 2 NOS Working + 1 NOS to act as Standby )</p>	NOS	3.00		
2.1	<p>Inland transportation to site, Lifting and Installation of Cooling Towers on concrete pedestals , Testing, Commissioning and Handing over of the above FRP Cooling Tower.</p>	NOS	3.00		
	<p><b>Operating Parameters :</b></p>				
	<p>Flow Rate - 2650 LPM</p>				
	<p>Refrigeration Capacity - 200 TR nominal</p>				
	<p>Entering water Temp - 32 Deg C</p>				
	<p>Leaving water Temp - 37 Deg C</p>				
	<p>Design Wet Bulb temperature - 25.6 Deg C</p>				

3.0	<b>PRIMARY CONSTANT FLOW CHILLED WATER PUMP :</b> Supply of Horizontal Split Casing / End Suction Pumps, factory assembled and tested for rated efficiency complete with CI casing & Bronze impeller, mechanical seals, vibration isolators , Coupling Guard, with necessary grouting, foundation bolts, FRP coated base frame etc. The motor shall be 1450 RPM TEFC squirrel cage induction motor with IP 55 protection and Class F insulation ( Motors with IE2 rating).				
	<b>Operating Parameters :</b>				
3.1	1817 LPM @ 12 M Head Chilled Water Pump ( 2 Nos working + 1 No standby)	NOS	3.00		
3.2	Chilled water pump shall be insulated to the same thickness as the pipe to which they are connected and application shall be same as per specs for pipes.	LOT	3.00		
3.3	Inland transportation to site, Lifting and Installation of Primary pumping system on concrete pedestals , Testing, Commissioning and Handing over of the above pumps. Chilled water pump shall be insulated to the same thickness as the pipe to which they are connected and application shall be same as per specs for pipes.	LOT	3.00		
4.0	<b>SECONDARY VARIABLE FLOW CHILLED WATER PUMP:</b> Supply of Horizontal Split Casing / End Suction Pumps, factory assembled and tested for rated efficiency complete with CI casing & Bronze impeller, mechanical seals, vibration isolators , Coupling Guard, with necessary grouting, foundation bolts, FRP coated base frame etc. The motor shall be 1450 RPM TEFC squirrel cage induction motor with IP 55 protection and Class F insulation ( Motors with IE2 rating). The motor shall be suitable for operation on variable frequency drive.				
	<b>Operating Parameters :</b>				

4.1	2631 LPM @ 22 M Head Chilled Water Pump ( 2 Nos working + 1 Nos standby)	NOS	3.00		
4.2	Chilled water pump shall be insulated to the same thickness as the pipe to which they are connected and application shall be same as per specs for pipes.	LOT	3.00		
4.3	Inland transportation to site, Lifting and Installation of Secondary pumping system on concrete pedestals , Testing, Commissioning and Handing over of the above pumps. Chilled water pump shall be insulated to the same thickness as the pipe to which they are connected and application shall be same as per specs for pipes.	LOT	3.00		
5.0	<b>VARIABLE SPEED PUMPING SYSTEM - CHILLED WATER</b>				
5.1	Dedicated micro processor based Pump Logic controller specifically designed for Chilled Water Variable Speed Pumping System , which can control up to 3 pumps in parallel, compatibility with all IBMS systems and protocol, CL/UL listed, 4 line character, LCD display etc.	SET	1.00		
5.2	Variable Frequency Drive with Hand-off /Auto macro designed for pumping application				
5.3	IP 55 PANEL				
5.4	Differential pressure sensors/transmitters - 2 Nos.				
5.5	Interfacing amongst all components & compatibility of I/O signals for open protocol				
5.6	Inland transportation to site, Lifting and Installation , Testing, Commissioning and Handing over of the above Variable speed pumping system.	LOT	1.00		

6.0	<b>CONSTANT FLOW CONDENSER WATER PUMP:</b> Supply of Horizontal Split Casing / End Suction Pumps, factory assembled and tested for rated efficiency complete with CI casing & Bronze impeller, mechanical seals, vibration isolators , Coupling Guard, with necessary grouting, foundation bolts, FRP coated base frame etc. The motor shall be 1450 RPM TEFC squirrel cage induction motor with IP 55 protection and Class F insulation ( Motors with IE2 rating). The motor shall be suitable for operation on variable frequency drive.				
	<b>Operating Parameters :</b>				
6.1	2650 LPM @ 28 M Head Condense Water Pump ( 2 Nos working + 1Nos standby)	NOS	3.00		
6.2	Inland transportation to site, Lifting and Installation of pumping system on concrete pedestals , Testing, Commissioning and Handing over of the above pumps.	LOT	3.00		
7.0	<b>PRESSURISED WATER EXPANSION TANK :</b>				

	<p>Supplying, installing, testing and commissioning of Pressurised Water Expansion Tank along with necessary accessories such as dual pumps etc. The tank shall be precharged steel expansion tank with replaceable heavy duty butyl rubber bladder. The tank shall have 50 mm system connection and 20 mm drain and charging valve connection to facilitate the on site charging of the tank to meet system requirement. The tank shall be fitted with lifting rings and a floor mounting skirt for vertical installation. The tank and air separator must be constructed in accordance with section VIII of the ASME Boiler and pressure vessel code and stamped 125 PSI working pressure. The complete system to be supplied and installed with all accessories and safety fixtures. The tank shall be insulated to the same thickness as the pipe to which they are connected and application shall be same as per specs for pipes.</p>				
7.1	Chilled water flow rate - 5262 LPM	SET	1.00		

8.0	<p><b>FLOOR MOUNTED AIR HANDLING UNITS : AUDITORIUM</b></p> <p>Supply, Installation, testing and commissioning of Factory assembled Double Skin AHU With 25 mm-40 kg/cum PUF Insulated detachable panels, extruded aluminium profiles, GI base frame, panel external skin with 0.6 mm pre-plasticised / pre-coated sheet, panel internal skin with 0.6 mm galvanised sheet, AMCA tested DIDW backward curved centrifugal fan with IE2 rating motor, drive assembly with taper lock pulley, belt, and belt guard for fan and motor, vibration isolators out of heavy duty rubberised mounts, prefilters with 3 ply HDPE 50 mm thick filters having an efficiency of 90% 10 Mic with filter frame, 6 row deep cooling coil, condensate drain pan coil trough with SS-304-20G insulated with 9 mm closed cell elastomeric foam, access door, Limit Switch, Emergency Light, Guard for Inspection Door, outlet damper of aerofoil blades &amp; PVC gears, flexible fire retardant flexible connectors complete with galvanised hardware.</p>				
	<p>Note : The fan shall be selected considering low noise application. Also the inside panel skin of the fan section should be factory finished with 10 mm thick open cell elastomeric nitrile rubber foam as detailed elsewhere for duct acoustic insulation.</p>				
8.1	35 TR capacity, 14000 CFM, 50mm Total SPWG	NOS	2.00		

9.0	<p><b>CEILING SUSPENDED AIR HANDLING UNITS :</b> Supply, Installation, testing and commissioning of Factory assembled Double Skin AHU With 25 mm-40 kg/cum PUF Insulated detachable panels, extruded aluminium profiles, GI base frame, panel external skin with 0.6 mm pre-plasticised / pre-coated sheet, panel internal skin with 0.6 mm galvanised sheet, AMCA tested DIDW backward curved centrifugal fan with IE2 rating motor,drive assembly with taper lock pulley, belt ,and belt guard for fan and motor, vibration isolators out of heavy duty rubberised mounts, prefilters with 3 ply HDPE 50 mm thick filters having an efficiency of 90% 10 Mic with filter frame, 6 row deep cooling coil, condensate drain pan coil trough with SS-304-20G insulated with 9 mm closed cell elastomeric foam, access door, Limit Switch, Emergency Light, Guard for Inspection Door, outlet damper of aerofoil blades &amp; PVC gears, flexible fire retardant flexible connectors complete with galvanised hardware.</p>				
	<p>Note : The fan shall be selected considering low noise application. Also the inside panel skin of the fan section should be factory finished with 10 mm thick open cell elastomeric nitrile rubber foam as detailed elsewhere for duct acoustic insulation.</p>				
9.1	8 TR capacity, 3200 CFM, 30mm Total SPWG	NOS	12.00		
9.2	6 TR capacity, 2400 CFM, 30mm Total SPWG	NOS	31.00		
9.3	5 TR capacity, 2000 CFM, 30mm Total SPWG	NOS	6.00		
9.4	4 TR capacity, 1600 CFM, 30mm Total SPWG	NOS	18.00		
10.0	<b>CHILLED WATER CASSETTE TYPE FAN COIL UNIT:</b>				

	Supply, installation, Testing and Commissioning of Ceiling suspended complete with chilled water copper tube aluminum finned coil, Fan with four directional flow aerofoil blade quiet high efficiency centrifugal fan, easily cleanable synthetic filter, Auto water pump - for auto drain water detection and pump out of drain pan, Pre-fitted valve station comprising ball valves with & w/o strainer, 2-way pressure independent balancing valve with modulating actuator , standard GI auxiliary drain tray with bottom extended tray as integral part, cordless remote for the fan speed and temp on-off, attractive grill as integral part of the unit, provision for fresh air intake. The unit shall be suitable for operation on Single phase 230 volts 50- cycles, the fan shall have three speed. Only 5 Amps plug point / MCB will be given within 3 M from cassette unit and from there on all wiring to be included.				
10.1	4.0 TR capacity	NOS	QRO		
10.2	3.0 TR capacity	NOS	6.00		
10.3	2.0 TR capacity	NOS	4.00		
10.4	1.5 TR capacity	NOS	2.00		
11.0	<b>CHILLED WATER HIGH WALL TYPE FAN COIL UNIT:</b>				

	Supply, installation, Testing and Commissioning of High Wall mounted Fan Coil unit complete with chilled water copper tube aluminum finned coil, Fan with DIDW centrifugal fan, easily cleanable synthetic filter, Auto water pump - for auto drain water detection and pump out of drain pan, Pre-fitted valve station comprising ball valves with & w/o strainer, 2-way pressure independent balancing valve with modulating actuator , standard GI auxiliary drain tray with bottom extended tray as integral part, cordless remote for the fan speed and temp on-off, attractive grill as integral part of the unit, The unit shall be suitable for operation on Single phase 230 volts 50- cycles, the fan shall have three speed. Only 5 Amps plug point / MCB will be given within 3 M from FCU and from there on all wiring to be included.				
11.1	3.0 TR capacity	NOS	QRO		
11.2	2.5 TR capacity	NOS	18.00		
11.3	2.0 TR capacity	NOS	28.00		
11.4	1.5 TR capacity	NOS	QRO		

12.0	<b>CONDENSER WATER PIPING :</b> Supply, installation, Testing and Commissioning of Heavy quality Class "C" MS Pipes (Conforming to IS 1239) up to 150 mm NB and as per IS 3589 for 200 mm NB ( 6 mm thick ) and above as per specs. Pipes to be cut to required lengths and installed with all welded joints , with necessary fittings like Elbows, Tees, Reducers, Table E Flanges, supporting and hanging arrangements including vibration isolation arrangements, flow indication etc and finally with two layers of epoxy painting and finish painting. All structural pipe supports shall be painted with epoxy primer finished with two coats of epoxy paint. All fasteners and nuts bolts etc shall be galvanised only. Contractor to include fitting accessories for the installation of pressure gauges, thermometer, BMS sensors , drain ports , air vents etc. The entire work should be carried out as per GMP.				
	Sample weld of pipe joint will be got approved by Purchaser / Engineer-in-charge before proceeding with piping.				
12.1	300 MM NB	RMT	135.00		
12.2	250 MM NB	RMT	175.00		
12.3	200 MM NB	RMT	100.00		
12.4	150 MM NB	RMT	50.00		
12.5	125 MM NB	RMT	QRO		
12.6	100 MM NB	RMT	75.00		
12.7	80 MM NB	RMT	QRO		
12.8	65 MM NB	RMT	QRO		
12.10	50 MM NB	RMT	30.00		
12.11	40 MM NB	RMT	50.00		
12.12	32 MM NB	RMT	QRO		
12.13	25 MM NB	RMT	QRO		

13.0	<b>BALANCING VALVE ( OUTLET OF EACH CONDENSER ) :</b> Supply, Installation, Testing & Commissioning of Balancing valves for flow regulating and measuring purposes. Valve shall be flanged type with cast iron construction with Nitrile Rubber Seat including all accessories like body, seat, disc, liner, bearing, shaft, handle, gear assembly etc . Rating shall be PN 16. All valves shall be provided with tapping for pressure drop measurements.				
13.1	200 MM NB	NOS	2.00		
14.0	<b>BUTTERFLY VALVES - CONDENSER WATER :</b> Supply, installation, testing & commissioning of Wafer type Butterfly valves with PN 16 pressure rating, Cast iron body , EPDM Seal, Stainless Steel 416 Shaft material, Nylon coated ductile iron lever lock handle and conforming to IS:13095, complete with companion slip on flanges as per BS10, nuts, bolts and gaskets as required.				
14.1	300 MM NB	NOS	QRO		
14.2	250 MM NB	NOS	QRO		
14.3	200 MM NB	NOS	16.00		
14.4	150 MM NB	NOS	3.00		
14.5	125 MM NB	NOS	QRO		
14.6	100 MM NB	NOS	QRO		
14.7	80 MM NB	NOS	3.00		
14.8	65 MM NB	NOS	QRO		
14.9	50 MM NB	NOS	3.00		
15.0	<b>SUCTION GUIDE -CONDENSER WATER :</b> Supply, installation, testing & commissioning of Pump Suction guide with integral strainer, drain plugs and suitable supports. The stainless steel strainer with 3 mm dia perforation shall be selected to suit the pump suction diameter with necessary accessories like flanges, fasteners, etc.				
15.1	200 MM NB	NOS	3.00		

16.0	<p><b>DUAL PLATE CHECK VALVES - CONDENSER WATER :</b>  Supply, installation, testing &amp; commissioning of dual plate check valves, wafer type sleep-on construction. The valve body shall be cast iron as per IS 210 Gr. FG 220. The valve disk shall be aluminium - bronze plate, SS 316 inch pins &amp; pins and springs rubber seal and should be rated for a pressure rating of ANSI 150 and duly insulated as per piping and specs.</p>				
16.1	200 MM NB	NOS	3.00		
17.0	<p><b>INSULATED CHILLED WATER PIPING - (Above Earth Level) :</b>  Supply, installation, Testing and Commissioning of Heavy quality Class "C" MS Pipes (Conforming to IS 1239) up to 150 mm NB and as per IS 3589 for 200 mm NB ( 6 mm thick ) and above as per specs. Pipes to be cut to required lengths and installed with all welded joints , with necessary fittings like Elbows, Tees, Reducers, Table E Flanges, supporting and hanging arrangements including vibration isolation arrangements, flow indication etc .The pipes shall be duly insulated with Closed Cell Elastomeric Nitrile rubber foam with manufacturer approved cold adhesive back up on one side . Thermal conductivity of Elastomeric Nitrile rubber shall not exceed 0.035 W/m Deg K. Fire category shall be Class O and Density of Material shall be between 40 to 60 Kg/m3.The insulation shall be covered with 24 G Aluminium cladding .</p>				
	Contractor to include Heavy density PUF saddles ( 50 mm thk with density of 90 kg / cum up to 125mm dia and 120 kg / cum for the pipes 150mm dia. and above )				

	All structural pipe supports shall be painted with epoxy primer finished with two coats of epoxy paint. All fasteners and nuts bolts etc shall be galvanised only. Contractor to include fitting accessories for the installation of pressure gauges, thermometer, BMS sensors , drain ports , air vents etc. The entire work should be carried out as per GMP.				
17.1	300 MM NB - 44 mm thick insulation.	RMT	QRO		
17.2	250 MM NB - 44 mm thick insulation.	RMT	230.00		
17.3	200 MM NB - 44 mm thick insulation.	RMT	50.00		
17.4	150 MM NB - 44 mm thick insulation.	RMT	80.00		
17.5	125 MM NB - 38 mm thick insulation.	RMT	360.00		
17.6	100 MM NB - 38 mm thick insulation.	RMT	115.00		
18.0	<p><b>CPVC INSULATED CHILLED WATER PIPING :</b> Supplying,fixing and testing of CHLORINATED POLYVINYL CHORIDE - CPVC pipes as per per IS:15778 and ASTM D 2846) with solvent' cement joints, class 6PN 12.5Kgf/cm2 class, together with CPVC pipe fittings, tee, bend, elbow specials as per PN 16 class fittings of approved make. Solvent cement should confirm to ASTM D 2564. Scope includes necessary fittings such as tee,elbow,union,nipple, including brass moulded fittings, brass male/female adapters etc. Scope also includes cutting and jointing using CPVC solvent cement as per manufacturer's recommendation and fixing the pipe with proper clamp supports, proper pipe supports etc. The pipes should be duly insulated with Closed Cell Elastomeric Nitrile rubber foam with manufacturer approved cold adhesive back up on one side . Thermal conductivity of Elastomeric Nitrile rubber shall not exceed 0.035 W/m Deg K. Fire category shall be Class O and Density of Material shall be between 40 to 60 Kg/m3.The insulation shall be covered with factory laminated aluminium cladding . The entire work should be carried out as per GMP.</p>				

	Contractor to include Heavy density PUF saddles ( 50 mm thk with density of 90 kg / cum up to 125mm dia and 120 kg / cum for the pipes 150mm dia. and above )				
18.1	80 MM NB - 38 mm thick insulation.	RMT	525.00		
18.2	65 MM NB - 38 mm thick insulation.	RMT	400.00		
18.3	50 MM NB - 38 mm thick insulation.	RMT	525.00		
18.4	40 MM NB - 32 mm thick insulation.	RMT	225.00		
18.5	32 MM NB - 32 mm thick insulation.	RMT	850.00		
18.6	25 MM NB - 32 mm thick insulation.	RMT	350.00		
19.0	<b>DRAIN PIPING :</b> Supply, installation, testing & commissioning of Drain piping carried out of CPVC and duly insulated with aluminium factory laminated closed cell elastomeric nitrile rubber insulation. For all other details refer to CPVC chilled water piping.				
19.1	50 MM NB - 9 mm thick insulation.	RMT	125.00		
19.2	40 MM NB - 9 mm thick insulation.	RMT	275.00		
19.3	32 MM NB - 9 mm thick insulation.	RMT	325.00		
19.4	25 MM NB - 9 mm thick insulation.	RMT	350.00		
20.0	<b>CENTRIFUGAL AIR-SEDIMENT SEPARATOR :</b> Supply, installation, testing & commissioning of Centrifugal air separator complete with insulated vessel, air vent. Etc., complete with mating flanges, fasteners. The air separator shall be suitably sized for the flow rate. The centrifugal air separator will be of M.S. construction with flanged connections. The air separator will be adequately sized to achieve maximum air-separation. It should be provided with an automatic air-vent at the top. It should be insulated as detailed for Chilled Water Piping exposed.	NOS	1.00		

21.0	<p><b>MOTORISED CHILLED WATER BUTTERFLY VALVES ( OUTLET OF EACH CHILLER AND DECOUPLER LINE ) :</b></p> <p>Supply, installation, testing &amp; commissioning of Wafer type Butterfly valve with suitable On/Off actuator fitted at chiller outlet. The valve actuator shall be compatible to IBMS . The valve shall have PN 16 pressure rating, Cast iron body , EPDM Seal, Stainless Steel 416 Shaft material, Nylon coated ductile iron lever lock handle and conforming to IS:13095, complete with companion slip on flanges as per BS10, nuts, bolts and gaskets as required and duly insulated as per piping and specs.</p>				
21.1	200 MM NB - 44 mm thick insulation.	NOS	3.00		
22.0	<p><b>BALANCING VALVE :</b></p> <p>Supply, Installation, Testing &amp; Commissioning of Balancing valves for flow regulating and measuring purposes. Valve shall be flanged type with cast iron construction with Nitrile Rubber Seat including all accessories like body, seat, disc, liner, bearing, shaft, handle, gear assembly etc . Rating shall be PN 16. All valves shall be provided with tapping for pressure drop measurements and duly insulated as per piping and specs</p>				
22.1	200 MM NB - 44 mm thick insulation.	NOS	2.00		
22.2	150 MM NB - 44 mm thick insulation.	NOS	1.00		
22.3	125 MM NB - 38 mm thick insulation.	NOS	3.00		
22.4	100 MM NB - 38 mm thick insulation.	NOS	QRO		
22.5	80 MM NB - 38 mm thick insulation.	NOS	QRO		
22.6	65 MM NB - 38 mm thick insulation.	NOS	2.00		
22.7	50 MM NB - 38 mm thick insulation.	NOS	QRO		
22.8	40 MM NB - 32 mm thick insulation.	NOS	12.00		
22.9	32 MM NB - 32 mm thick insulation.	NOS	37.00		
22.10	25 MM NB - 32 mm thick insulation.	NOS	18.00		

23.0	<b>BUTTERFLY VALVES - CHILLED WATER :</b> Supply, installation, testing & commissioning of Wafer type Butterfly valves with PN 16 pressure rating, Cast iron body , EPDM Seal, Stainless Steel 416 Shaft material, Nylon coated ductile iron lever lock handle and confirming to IS:13095, complete with companion slip on flanges as per BS10, nuts, bolts and gaskets as required duly insulated as per piping and specs.				
23.1	250 MM NB - 44 mm thick insulation.	NOS	3.00		
23.2	200 MM NB - 44 mm thick insulation.	NOS	16.00		
23.3	150 MM NB - 44 mm thick insulation.	NOS	2.00		
23.4	125 MM NB - 38 mm thick insulation.	NOS	6.00		
23.5	100 MM NB - 38 mm thick insulation.	NOS	QRO		
23.6	80 MM NB - 38 mm thick insulation.	NOS	QRO		
23.7	65 MM NB - 38 mm thick insulation.	NOS	4.00		
23.8	50 MM NB - 38 mm thick insulation.	NOS	QRO		
23.9	40 MM NB - 32 mm thick insulation.	NOS	24.00		
23.10	32 MM NB - 32 mm thick insulation.	NOS	74.00		
23.11	25 MM NB - 32 mm thick insulation.	NOS	36.00		
24.0	<b>SUCTION GUIDE -CHILLED WATER :</b> Supply, installation, testing & commissioning of Pump Suction guide with integral strainer, drain plugs and suitable supports. The stainless steel strainer with 3 mm dia perforation shall be selected to suit the pump suction diameter with necessary accessories like flanges, fasteners, etc. duly insulated as per chilled piping and specs.				
24.1	200 MM NB - 44 mm thick insulation.	NOS	6.00		

25.00	<b>DUAL PLATE CHECK VALVES - CHILLED WATER :</b> Supply, installation, testing & commissioning of dual plate check valves, wafer type sleep-on construction. The valve body shall be cast iron as per IS 210 Gr. FG 220. The valve disk shall be aluminium - bronze plate, SS 316 inch pins & pins and springs rubber seal and should be rated for a pressure rating of ANSI 150 and duly insulated as per piping and specs.				
25.1	200 MM NB - 44 mm thick insulation.	NOS	6.00		
26.0	<b>2-WAY AHU ROTARY VALVES - CHILLED WATER :</b> 2-WAY AHU ROTARY VALVES - CHILLED WATER : Supplying, installation, testing and commissioning of complete controls for AHUs comprising of a set of 2 way modulating proportional linear type motorized valve having manual override facility with proportionate thermostat and wiring for interconnection with 1.5 sq.mm copper conductor multicore armoured cable , linkage kit , duly insulated as per chilled water piping complete as per specifications and as required.				
26.1	65 MM NB - 38 mm thick insulation.	NOS	2.00		
26.2	50 MM NB - 38 mm thick insulation.	NOS	QRO		
26.3	40 MM NB - 32 mm thick insulation.	NOS	12.00		
26.4	32 MM NB - 32 mm thick insulation.	NOS	37.00		
26.5	25 MM NB - 32 mm thick insulation.	NOS	18.00		
27.0	<b>Y-TYPE STRAINER - CHILLED WATER :</b> Supply, Installation, Testing and Commissioning of Y – Strainers CI fabricated complete with SS - 304 perforated sheet basket having 3 mm perforated hole, PN-16 pressure rating body, Tabel-E flanged ends and duly insulated as per piping and specs.				
27.1	65 MM NB - 38 mm thick insulation.	NOS	2.00		
27.2	50 MM NB - 38 mm thick insulation.	NOS	QRO		
27.3	40 MM NB - 32 mm thick insulation.	NOS	12.00		
27.4	32 MM NB - 32 mm thick insulation.	NOS	37.00		

27.5	25 MM NB - 32 mm thick insulation.	NOS	18.00		
28.0	<p><b>PRESSURE GAUGES :</b>  Supply, Installation, Testing and Commissioning of of Indicating-dial type pressure gauges of Dry type made of Stainless steel or cast aluminum case, 114-mm dia, Pressure-Element Assembly: Bourdon tube, Pressure Connection : Brass, NPS 12mm dia bottom-outlet type, Dial: Satin-faced, non-reflective aluminum with permanently etched scale markings, Pointer: Red or other dark-color metal, Window: Glass, Accuracy: Grade A, plus or minus 1 percent of middle half, Stainless Steel U-Siphon ,GI nipple with coupling and 15mm Brass body ball valve as per specification. Syphons and cocks to be provided along with SS snubber. Provide Nitrile rubber insulation covered with UV coating for U-siphon and valve used on Chilled water piping.</p>	NOS	158.00		
29.0	<p><b>DIAL TYPE THERMOMETERS :</b>  Supply, Installation, Testing and Commissioning of Indicating-dial type, 100mm Dia,Stainless steel Case &amp; Stem; Sensing element with Bi-metal strip coiled, IP 65 Protection, Dial with Aluminium black graduation on white background, Pointer with Aluminium black coloured Slotted zero adjustable, Window with Sheet Glass and of length to suit installation, Neoprene Gasket material, Accuracy with Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range, Measuring range 0-50 deg C. It should be installed in the thermowells as per specs.</p>	NOS	152.00		
30.0	<p><b>DRAIN VALVE :</b>  Supply, Installation, Testing and Commissioning of Ball Valve for drain with insulation. Nipple and dummy to be fixed after the gate valve of size 25 mm NB.</p>	NOS	15.00		

31.0	<b>AUTO AIR VENT VALVES :</b> Auto Air valves to be provided at all high points in the piping system for venting. Valves shall be of the double float type with G.M body, vulcanite balls, rubber seating, etc. of 20 mm NB and shall be associated with an equal size gate valve with rising spindle.	NOS	20.00		
32.0	<b>EXPANSION JOINT BELLOW CONNECTORS:</b> Supply, installation, testing of commissioning of Expansion Joints -Double sphere flexible connections, PN 16 rating with mating GI Flanges Nuts, Bolts and restraining control rod. Price to include for flexible insulation. Connectors shall have flanged-end connections to match equipment connected and shall be capable of 20-mm misalignment as per specification.				
32.1	200 MM NB	NOS	24.00		

33.0	<p><b>GSS FACTORY FABRICATED INSULATED SPIRAL DUCTING :</b>  Supply, Installation, Testing &amp; Commissioning of Factory Fabricated Spiral Galvanised Steel Sheet Ducting made of Lock-forming quality GSS Class VIII ; complying with IS: 277 and having 120 GSM coating classification complete with fittings like bends, reducers, Tee connections and necessary supports etc in accordance with the approved shop drawings and specifications . The ducts shall be round eccentric with bottom flat. The supports shall be of gripple make wire ropes. The inner surface of the spiral ducts should be insulated with <b>9 mm thick</b> class O rated Closed Cell Elastomeric Nitrile rubber and shall be stuck to the cleaned duct inside surface by manufacturer recommended cold adhesive . Insulation Material Thermal conductivity shall not exceed 0.035 W/m Deg K and density not less than 40 Kg/m3. The material and installation methodology should be in accordance with the specifications. Finally the external surface of the spiral duct should be applied with 1 coat of primer and spray painted with 2 coats of synthetic enamel paint of approved shade.</p>				
33.1	24 G - 0.63 mm - ( Dia 600 mm and less)	SQMT	2000.00		
34.0	<p><b>GSS FACTORY FABRICATED RECTANGULAR DUCTING :</b>  Supply, Installation, Testing &amp; Commissioning of Factory Fabricated Rectangular Galvanised Steel Sheet Ducting ( as per SMACNA ) made of Lock-forming quality GSS Class VIII ; complying with IS: 277 and having 120 GSM coating classification with 4-bolt TDC joint, GI full threaded rods and GI slotted channel support /hangers with bolts, nuts neoprene fire retardant gaskets and sealed with RTV / silicon sealant, elbows, turning vanes, slip on flanges, in accordance with the approved shop drawings and specifications , sizes and quantities as below :</p>				

34.1	24 G - 0.63 mm	SQMT	975.00		
34.2	22 G - 0.80 mm	SQMT	225.00		
34.2	20 G - 1.00 mm	SQMT	25.00		
35.0	<p><b>GSS SITE FABRICATED RECTANGULAR DUCTING :</b>  Supply, Installation, Testing &amp; Commissioning of SITE Fabricated Rectangular Galvanised Steel Sheet Ducting ( as per IS 655 ) made of GSS Class VIII ; complying with IS: 277 and having 120 GSM coating classification, GI full threaded rods and GI slotted channel support /hangers with bolts, nuts neoprene fire retardant gaskets and sealed with RTV / silicon sealant, elbows, turning vanes, slip on flanges, in accordance with the approved shop drawings and specifications , sizes and quantities as below :</p>				
35.1	24 G - 0.63 mm	SQMT	QRO		
35.2	22 G - 0.80 mm	SQMT	QRO		
36.0	<p><b>FLEXIBLE DUCT CONNECTOR:</b> Supply and installation of Flexible Duct Connection factory made with Fire Retardant both sides PVC coated Double Polyester Fabric having density of 680 gms per M2 with both sides reinforced with GI strips roll formed special type locking arrangements with Polyester Fabric without puncturing the Fabric and subsequently TDF formed, ready to fit Flexible Duct Connectors.</p>				
36.1	35 TR AHU	NOS	2.00		
36.2	8 TR AHU	NOS	12.00		
36.3	6 TR AHU	NOS	31.00		
36.4	5 TR AHU	NOS	6.00		
36.5	4 TR AHU	NOS	18.00		
36.6	600 CFM @ 10 mm st.pr for Toilets	Nos	16.00		
36.7	3000 CFM @ 15 mm st.pr for Plant room ventilation	Nos	3.00		

37.0	<p><b>"LOW LEAKAGE VOLUME CONTROL / DUCT DAMPERS:</b>  Supply, installation, testing and commissioning of Factory fabricated Aerofoil-blade Aluminium dampers with compressible jamb seals and extruded-vinyl blade edge seals, in opposed-blade arrangement with steel operating rods rotating in nylon bearings mounted in a single extruded aluminium frame, and with hard PVC/Nylon gear arrangement for common linkage between blades. Frames and blades to be constructed from high quality extruded aluminium sections. Frame with flat frontal face to suit flanged connections with the ducts. Frames to be screw fixed and sealed to eliminate casing leaks. Blades to be pivoted on PVC bushes and operated through PVC gear system to be fully enclosed within the damper frame.</p>	SQMT	2.00		
38.0	<p><b>LINEAR FIXED BAR GRILLE :</b>  Supply, Installation,Testing and Balancing of Powder Coated Linear fixed Bar Grille of Extruded aluminium construction, frame with frontal face flange of 16 mm and inner blades of 0,15,30,45 deg deflections 5 mm nominal thickness, blade pitch 12.5 mm, removable core type. The vertical tubed core construction should be black powder coated. The exact construction like one way, two way,curved, deflection angle etc can be decided at the appropriate time.</p>	SQM	50.00		
38.1	Same as above : Neck size : 150 mm x 150 mm	NOS	160.00		

39.0	<p><b>JET NOZZLE :</b>  Supply, Installation, Testing and Balancing of Powder coated High quality Aluminium Jet nozzles suitable for long throw distances with optimum acoustic properties, designed with fixed construction consisting of a nozzle with fixing holes along with adjustable construction consisting of a spherical discharge nozzle mounted flange and circular spigot. The nozzle should be adjusted manually up to max. 30° in any direction. The external ring should be with a curved profile and spherical inner nozzle using the mechanical principle of eye ball ( ball and socket principle) engineered to swivel 360 deg .</p>				
39.1	300 mm dia	NOS	30.00		
40.0	<p><b>COLLAR DAMPER :</b>  Supply, Installation, Testing and Balancing of Opposed Blade GI Black painted Collar Dampers, with pressed form blades &amp; frames, 22G frame &amp; 26G blade (double skin)</p>	SQMT	50.00		

41.0	<p><b>FIRE AND SMOKE DAMPERS :</b>  Supply, Installation, Testing and Commissioning of fire and smoke damper tested and approved for 120 minutes rated as per UL-555 S- 1995 and CBRI. Construction out of factory - made, 1.6 mm thick 800 mm long , 150 mm wide GSS sleeves and inner V grooved flat type multi blade assembly. Frames to be welded and inner blades to be connected to the frame by means of chrome plated spindle rods and bronze self lubricated bushes. All blades to be connected by a suitable flat link arrangement. The dampers are also to be provided with SS concealed jam seal (compression type) on the sides. The damper operation is by spring return actuator. It shall be complete with control panel, sensor and inter-locking/ wiring / connection for tripping of the AHU fan motor</p>	SQMT	1.00		
42.0	<p><b>FIRE DAMPER ACTUATOR :</b>  Supply, Installation, Testing and Commissioning of UL Listed Smoke rated Fire damper spring return type on/off actuator, 2-position operation, 24VAC/230VAC power supply, necessary control cabling (15m) to the nearest Fire Alarm module with mounting accessories. The minimum torque rating for the actuator shall be 16 NM.</p>	NOS	6.00		

43.0	<p><b>ACOUSTIC INSULATION OF DUCTS :</b>  Supply and Application of <b>10 mm thick</b> Acoustic insulation for the initial portion of supply air ducting. Material of construction shall be fibre free open cell Elastomeric Nitrile rubber foam with self adhesive back up on one side. The density shall be minimum 140 Kg/m<sup>3</sup> and maximum thermal conductivity – K value 0.047 W/m Deg K at 20 Deg C. The insulation should be non-eroding &amp; should pass Air Erosion Resistance Test in accordance to ASTM Standard C 1071-05 (section 12.7) . The material should confirm to Class 1 rating for surface spread of Flame in accordance to BS 476 Part 7 and UL 94, 1996. The material and installation methodology should be in accordance with the specification</p>	SQMT	350.00		
44.0	<p><b>THERMAL INSULATION OF DUCTS :</b>  Supply and Application of 8 mm thick thermal insulation on GSS ducts complete with Closed Cell Elastomeric Nitrile rubber foam with Microban antimicrobial protection and with self adhesive back up on one side , minimum density of 40 Kg/m<sup>3</sup> with minimum thermal conductivity-K value of 0.033 W/m Deg K at 0 Deg C, confirming to Class 'O' fire safety, inner side stuck to the outer facia of the GSS ducts with factory applied self adhesive. Joints should be sealed with 50 mm wide 6 mm thick self adhesive tape with Microban protection. The material and installation methodology should be in accordance with the specifications.</p>				
44.1	19 mm thick	SQMT	200.00		
44.2	13 mm thick	SQMT	450.00		
44.3	9 mm thick	SQMT	400.00		

45.0	<p><b>SOUND ATTENUATING UNITS:</b> Supply and Fixing of Sound Attenuators of Dissipative type. The duct sound attenuators shall be factory fabricated with the 1.00 mm thick GSS sheet metal enclosure casing, fitted with suitable flanges to make clean airtight connections to ductwork. Sound Attenuators shall consist of outer casing, 15 mm thick open cell structure elastomeric nitrile rubber foam sound absorbing material and internal baffles, splitters and supports . (area calculation : ((W+H)x2)xL).</p>	SQMT	60.00		
46.0	<p><b>ACOUSTIC INSULATION OF AHU ROOM :</b> Supply and Application of Acoustic insulation for AHU room using 50 mm thick ( 500 GSM ) polyester fibre covered with one layer of RP tissue &amp; 24 g Aluminium perforated panels as per the application methodology given in specs.</p>	SQMT	100.00		
47.0	<p><b>UNDER DECK INSULATION :</b> Supply and Application of insulation for underdeck portion of the exposed roof. Material of construction shall be cross linked polyolefin foam material with closed cell structure and with factory applied reinforced aluminium foil. The density of the same shall be within 30 Kg/m3.The material should have a thermal conductivity not exceeding 0.032 W/mK. The Thickness of the material shall be <b>40 mm</b>. The entire job should be carried out as per the application methodology given in specs.</p>	SQMT	1400.00		
48.0	<b>INLINE FANS</b>				

	Supply, installation, testing and commissioning of Inline cabinet fans with GSS cabinet complete with inlet and outlet spigots. The fan should be direct drive, high efficiency forward curved DIDW impeller with galvanised steel scroll. The motor should be single phase-squirrel cage induction type with sealed for life bearing. and complete with GI gravity louvers and bird screen. Ratings as below :				
48.1	600 CFM @ 10 mm st.pr for Toilets	Nos	16.00		
48.2	3000 CFM @ 15 mm st.pr for Plant room ventilation	Nos	3.00		
48.3	Inland transportation to site, Lifting, Installation , Testing, Commissioning and Handing over of the above Ventilation Unit.	Nos	19.00		
48.4	Supply and fixing of Ceiling fan of size 1500 mm dia ( reputed make only ) with BEE 3 Star rating complete with all accessories, ceiling suspension and step type electronic regulator.	Nos	2.00		
49.0	<b>CHILLER PLANT MANAGER</b>				
49.1	<b>Chiller Plant manager as described below.</b>	SET	1.00		
	Supply, installation, testing & commissioning of chiller plant manager as per above chillers requirement. The plant manager shall be suitable to control all the chillers being proposed by the tenderer and all suitable modules ( I/ O ) shall have to be provided so that individual Micro Processor controlled panels of machines can be synchronised for chillers, pumps and cooling tower operation and to enable sequential operation to achieve equal operating time and take care of load patterns and shall be as per specification.				
	Note :- All bill of items are to be read in conjunction with specifications and drawings and ensure the following points are being considered.				

	<p>Operator Workstation ( Reputed brand only ) with Intel Core i7 64-bit, 8 GB RAM, 500GB Hard Disk, 21" LED Monitor, DVD RW DL, KB, Mouse, Tower , 21" TFT colour monitor, optical mouse, key board, speakers inter connecting connectors and all other standard ports and accessories, Licenced Windows 8 Professional Advanced Operating system Software &amp; Licenced Anti-Virus Software and laser printer suitable for ' A-4' size. The above mentioned requirements is minimum. The exact requirement shall be to suit the vendor requirement and will include all latest softwares.</p>				
	<p>Providing, installing, testing and commissioning of network supervise control unit (imported UL listed) for connecting all controllers to it and software integration to Chiller plant machine and transferring data to P.C. The processor shall be 32 bit, 50 MHZ shall be able to store reports and events logs &amp; shall be able to store reports and events logs &amp; shall have a display unit.</p>				
	<p>Dedicated chiller plant manager software having inbuilt application.</p>				
	<p>Integrators/Modems/Gateways for software , open source protocol compatible Integration of chillers with Chiller plant manager etc. complete as per specifications and drawings</p>				
	<p>Providing, installation, testing &amp; commissioning of programmable controller (imported UL listed) having processors of 32 Bit 50 MHZ, (LON CHIP) Open source protocol compatible, controller for Pumps, Cooling towers. The Controller shall support easy graphical Programming and shall be able to store the programme in the controller rather than store in the PC. it should include Lockable Mounting cabinets duly powder coated, connecter strip, internal wiring etc.</p>				

	Supply, installation ,testing and commissioning of Field devices including rigid GI conduit, control and signal cables, Lan cables etc:				
	Supply, installation ,testing and commissioning of Field devices including rigid GI conduit, control and signal cables, Lan cables, Immersion temp sensor with well , combined temp and RH sensor, DP switches (water), Current Relay .Note:- Quantity will be as required at the time of execution of the work				
50.0	<b>WATER SOFTNER SYSTEM :</b>	SET	1.00		
	<b>Softener shall Designed for onsite well water available</b>				
	Supplying, installing, testing and commissioning approved make operated PLC based automatic water softener with necessary Ancillary equipment complete with piping, valves ejector, orifice plate, salt saturator made of corrosion resistant material and hardness testing kit etc., complete as per detailed specification for the efficient working of the system refer basic data Clause for inlet and outlet water Characteristics Max :working pressure 3.5 kg/cm2 Regeneration time - 10 Hours/day Capacity : 10 Cum/hr - 1 LOT				
	Supplying, installing, testing and commissioning of on line Automatic Electronic Metered Dosing system for preventing algae formation including a 200 L capacity storage tank etc complete all the fully automatic working on actuators. - 1 LOT				

	Supplying, installing, testing and commissioning of Raw Water Filter feed monoblock lift monoblock construction pump of adequate HP capable of giving required discharge at suitable head to work on 3 phase 50Hz 400/440 V with necessary unions, flanges, foundations bolts etc., complete with head conditions. (2no. working and 1no. Standby = 1 set) Duty : 2.5 lps @ 20m head. - 1 LOT				
	Supplying, installing, testing and commissioning inter unit . CPVC piping with necessary flanges, bolts, nuts, neoprene gaskets, welding wherever necessary, with necessary control valves, non return valves etc and with one coat of primer and two coats of approved enamel paint with IS recommended color etc., complete. - 1 LOT				
	Flow Meter As per requirement and BMS compatible with digital display.				
	Vendor to include all products and consumables as and when required for smooth operation and protection from scaling , corrosion and also for controlling micro biological growth. No input assistance will be provided by the Purchaser.				
	<b>ELECTRICAL WORKS:</b>				
51.0	<b>L.V. MAIN HVAC PANEL</b>	NOS	1.00		
	Supply, Installation Testing and Commissioning of the following Panel1000A ,50KA 4P EDO ACB with door interlock, and automatic safety shutters to shroud the busbar side. Suitable barrier shall be provided on the in coming and outgoing side of the circuit breaker shall also provided with Microprocessor based O/L, S/C, E/F protection with suitable protection CT,s shunt trip & Undervoltage releases.				
	Metering for incomer:				

	1No Multifunction Meter with RS485/Modbus				
	1set of 2500A/5A, Class1, 15VA Cast resin CT's for metering				
	1Set R,Y,B Indications Lamps with control MCB				
	1Set ACB ON, OFF & TRIP Indication Lamps				
	1Set ACB T/N/C Switch				
	Bus Bars				
	1000A, 50KA, TPN Aluminium busbars, Interconnections with colour coated heat shrinkable sleeves and SMC Busbar supports ,Current density of the bus bars shall not exceed 0.8A/Sq.mm				
	Outgoings:				
	3 Nos. 315A, 50KA, TPN MCCB				
	3 Nos of 22.5KW Star-Delta Starter Feeders				
	3 Nos of 11.5KW Star-Delta Starter Feeders				
	3 Nos of 18.5KW VFD feeder with Star-Delta Bypass arrangement.				
	2 Nos of 7.5KW VFD feeder with Star-Delta Bypass arrangement.				
	1 Nos of 2.2 KW DOL Starter Feeders				
	1 Nos of 2.2 KW Feeders				
	2 Nos. 63A, 50KA, TPN MCCB				
	All Outgoing feeders shall have Indication Lamps.				
52.0	<b>WALL MOUNTED ELECTRICAL PANEL - AHU</b> : Supply , Installation, Testing & Commissioning of Electrical panel (wall mounted) with metering device, digital volt meter, digital ammeter ,suitable for AHU motor with incomer of MCCB (upto 15 Kw), and out going feeders for AHU motor with star delta starter, transformer for field instruments, 2-Rotary Valve Fire damper limit switch, and with potential free contacts.	NOS	2.00		

53.0	<b>WALL MOUNTED ELECTRICAL PANEL - WATER SOFTNER SYSTEM</b> : Supply , Installation, Testing & Commissioning of Electrical panel (wall mounted) with metering device, digital volt meter, digital ammeter ,suitable for Water Softner Motors with incomer of MCCB (upto 15 Kw), and out going feeders for various motor withs starters , transformer for field instruments, and with potential free contacts.	NOS	1.00		
54.0	<b>L.T. Cables</b>				
	Supply and laying in Trays, dressing, clamping, testing and commissioning of 1.1KV grade XLPE insulated Al. / Cu. Conductor cable of following sizes.				
54.1	3.5C x 400 Sq.mm Al. Ar. XLPE Cable	RMT	360.00		
54.2	3.5C x 300 Sq.mm Al. Ar. XLPE Cable	RMT	60.00		
54.3	4C x 10 Sq.mm Cu. Ar. XLPE Cable	RMT	30.00		
54.4	4C x 6 Sq.mm Cu. Ar. XLPE Cable	RMT	QRO		
54.5	4C x 6 Sq.mm Cu. Ar. XLPE Cable	RMT	400.00		
54.6	4C x 2.5 Sq.mm Cu. Ar. XLPE Cable	RMT	200.00		
54.7	4C x 1.5 Sq.mm Cu. Ar. XLPE Cable	RMT	200.00		
55.0	<b>L.T. Terminations</b>				
	Cable end termination for 1.1KV grade XLPE / PVC insulated Ar. Al. / Cu conductor cables using double compression gland with Al/Cu. Lugs bimetallic washers and all consumables material and accessories	LOT	1.00		
56.0	<b>Cable Tray system</b>				

	Supply, installation & commissioning of <b>2mm thick G.I. Cable trays</b> of following sizes				
56.1	150 x 50 mm Ladder type Cable Tray	RMT	50.00		
56.2	200 x 50 mm Ladder type Cable Tray	RMT	40.00		
57.0	<b>Cable Tray Supports</b>				
57.1	Supply, Fabrication, Erection of structural steel including 2 coats of red oxide primer & 2 coats of approved enamel paint. Items including all channels and angles, suspension supports, steel plate, anchor bolts, cross angles, brackets, etc.	KG	500.00		
57.2	8mm Threaded rod for cable tray supports	RMT	60.00		
57.3	M12 Anchor fastners for Threaded rod	NOS	160.00		
	<b>Earthing</b>				
58.0	Supply & Erection ,Testing of GI Pipe Electrode Earthing termination for a lower resistance value with Ground Enhancing compound to fill up the excavated earth, It absorbs the surrounding moisture and ensures dissipation of any lightning / fault current. Made of GI electrode having a dia of 40 mm and length of 3 meters.	NOS	4.00		
	<b>GI Earthing Conductor</b>				
59.0	Supply, laying and termination of the following sizes of earth flats and wires laid underground at 600mm deep / on Cable trays/ drawn through pipe sleeves along with column/ walls for safety earthing as per specifications. All joints in the runs of the conductor shall be welded. All weld joints shall be protected with bitumen paint. The equipment tape connections shall be bolted using galvanized hardware.				
59.1	50 x 6mm GI flat	RMT	50.00		
59.2	25 x 3mm GI flat	RMT	250.00		
59.3	8 SWG Cu. wire	RMT	75.00		

60.0	<b>Safety Items</b>				
60.1	Supply and installation of following safety accessories				
60.2	1.1 KV Class 20mm Thick 900x1800mm rubber mat.	NOS	3.00		
60.3	Shock treatment chart in English and Local Language duly framed with glass cover	NOS	1.00		
60.4	440V class enameled danger board of 150x150mm size	NOS	1.00		
60.5	First aid box complete with all standard first aid materials	NOS	1.00		
70.0	<b>PLANT ROOM LIGHTING SYSTEM :</b>				
70.1	Supply, Installation, Testing and Commissioning of 1X36W LED Patti light fitting with all accessories and interconnecting with 3 core 1.5 sqmm PVC insulated FRLS copper wire and fixing the same in the ceiling / wall as per site conditions.	NOS	28.00		
70.2	Supply, installation, testing & commissioning of 4Way SPN double door Lighting distribution boards (LDB) conforming to the technical specifications for MCB DB's & comprising of the following : Incomer: 1No - 32A DP MCB and Outgoings: 4 Nos - 10A SP MCB"	SET	1.00		
70.3	Supply & fixing of the following sizes of heavy duty (2mm) PVC conduits for laying different service wirings -25mm PVC Pipe	RMT	225.00		
70.4	Supply, laying, testing & commissioning of 3core 2.5sqmm FRLS copper flexible cable in existing conduits for light fittings	RMT	450.00		
71.0	<b>MCB WITH WEATHER ENCLOSURES</b>				
71.1	10 A MCB	NOS	70.00		
71.2	5 A MCB	NOS	60.00		

72.0	<p><b>PLANT ROOM / AHU ROOM PARTITION WALL :</b>          Providing Brick work in C.M. 1:6(One cement and six sand) using Fly Ash Bricks of size 230 x 110 x 70mm in cement mortar including curing etc. Internal Plastering with cement mortar 1:4 (One cement and four sand) minimum 12mm thick including curing etc. Providing Two coats of 'Premium Emulsion Paint' of approved colour /shade over one coat of water based primer and two coats of putty including preparation of surface by scrapping and thorough cleaning as per manufacturer's specification fully to give an even shade as approved and curing as per manufacturers specifications and as directed. Item to include all accessories, tools &amp; labour, men and material , cleaning, depropping, clearing complete etc. Item to include getting mock-up for 2 sqm area. Paint should be with low VOC . The entire job should be carried out as per GMP and should complying with standard specification. The decision of the PURCHASER is the final in any issue regarding this item.</p>	SQMT	150.00		
73.0	<p><b>FIRE DOORS FOR AHU ROOM :</b>          Supply and fixing of Single Door Opening Flush Doors with honeycomb core infill, fabricated out of GI sheets - 1.2mm for the shutter and 1.6mm for the frame with 60 minutes fire rating. The Shutter Thickness to be 46mm .The entire assembly to be factory finished with epoxy primer and polyurethane-finish paint. All doors to be prepared to take suitable template hardware as recommended or specified. The doors are to be delivered along with hardware of approved make or as suggested. Fire rated door Double leaf of size : 1500 x 2100mm without vision panel.</p>	NOS	5.00		

74.0	<p><b>ASSOCIATED CIVIL WORKS:</b>          Providing RCC foundation for water chilling machines with angle iron framework at the edges to protect these from damage.PCC floating foundation blocks for Cooling towers, Pumps, AHUs, MCC etc with angle iron framework at the edges to protect these from damage.Cutting holes, chases and the likes through all types of non structural walls and finishing for all type of wall crossings, including sealing, framework, fire proofing, providing sleeves, cover plates, making good structure and finishing to an approved standard.Scaffolding as and when required. Note : No type of civil or related work will be done by the purchaser. The vendor has to make suitable arrangement to provide the same. The purchaser's decision is final in any issue relating to civil works. The entire job to be carried out as per GMP.</p>	LOT	1.00		
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75.0	<p><b>TABLE FOR CHILLER PLANT MANAGER OPERATOR :</b>  Providing and Fixing of Table of Size- 4'-0" X 2'-6" X 2'-6" &amp; Side Table Size - 3'-0" X 1'-6" X 2'-3" made out of 18mm thick marine ply wood frame work for the table, side table, top from apron, shutter, unit sides, 12mm thick marine ply drawer sides, key board sides, sliding shutter, foot rest, 6mm thick marine ply for back, drawer unit back, drawer bottom etc, with 3"X6mm, 1"x1",1 1/2"X1 1/1" C.P. Teak wood matching colour veneer beading, moulding etc complete. The table front shall have 12mm thick marine ply wood panel with 4"X12mm thick border along with one drawer unit with one pencil try, 3 No's of equal drawers, key board drawer and side table shall have 3" deep 2 Nos drawer at top and sliding shutter below the drawer etc. complete. All exposed surface shall have approved make/colour 4mm thick veneer and inside surface finish with 1mm thick laminate along with approved make/design hardware such as twin telescopic sliding channel, design handles, brass hinges, 12mm thick plywood of 2'-0"X1'-6"X9" in height slope type foot rest , powder coated CPU trolley, suspended type brushed steel flush wire manager. The purchaser's decision is final in any issue relating to this works. The entire job to be carried out as per GMP.</p>	SET	1.00		
76.0	<p><b>CHAIR FOR CHILLER PLANT MANAGER OPERATOR :</b>  Providing Ergonomically design Medium Back chair / Revolving / Gas Height Adjustment /Permanent Contact Mechanism / pp fixed arms / nylon base with twin wheel castors .Upholstery QUILTED FOAM LEATHER 37" Ht of the chair, Seat Size 19" X 19" Back Size 19"X 17". The purchaser's decision is final in any issue relating to this works. The entire job to be carried out as per GMP.</p>	NOS	2.00		

77.0	<b>FABRICATED STEEL WORK :</b> Supply, Fabrication , Cutting, Welding , Erection at site and painting of M. S. Angle structural steel work for outdoor unit location etc based on the approved drawings. The work should be carried out as per good manufacturing and installation practices in concurrence with approved drawing. The structural steel materials should confirm to IS: 2062 (latest version) as per drawings. All welding electrodes to confirm to relevant IS codes. Fabrication and erection of the structural steel works shall be as per IS : 800 and welding work as per IS:816 and IS : 822. Finally all steel work to be painted with one coat of zinc chromate primer and two coats of synthetic enamel paint.	KG	3500.00		
78.0	<b>All Inclusive Maintenance charges for the entire system for a period of one from the date of expiry of defects liability period.</b>				
78.1	First Year after the expiry of defects liability period.	LOT	1.00		
78.2	Second Year after the expiry of defects liability period.	LOT	1.00		
78.3	Third Year after the expiry of defects liability period.	LOT	1.00		
79.0	<b>OPERATION CONTRACT :</b> Routine Operation Contract of the entire high side and low side of the HVAC package comprising of all the machinery, equipment installed by the vendor from the date of commissioning till the date of commencement of defects liability period. The system should be operated in accordance to the instructions given by the Purchaser as and when required.	LOT	1.00		
79.1	Same as above during the defects liability period	LOT	1.00		
79.2	Same as above during the FIRST year after Defects Liability period.	LOT	1.00		
79.3	Same as above during the SECOND year after Defects Liability period.	LOT	1.00		

	<b>GRAND TOTAL</b>				
1.0	<b>Note : Itemwise Prices shall be inclusive of all Taxes, Duties, Entry Tax etc as applicable. No extra claim will be entertained at a later date.</b>				
2.0	<b>Note : Potential free contactors shall be provided the HVAC vendor as and when required for the HVAC package.</b>				
4.0	<b>Note : The HVAC vendor shall work in close co-ordination with other agencies for smooth completion of the project.</b>				
5.0	<b>Note : For Air terminal products the powder coating colour shade will be decided at the appropriate time.</b>				
6.0	<b>Note : All BMS compatible devices should be suitable for Open protocol.</b>				