

### SCHEDULE OF QUANTITIES

ITEM	DESCRIPTION	UNIT	QTY.	RATE
1.	<b>EQUIPMENT</b>			
1.1	<b>AIRCOOLED SCREW CHILLERS</b>			
	<p>Supply,Installation,Testing and Commissioning of high efficiency air cooled chiller packages each of 110 TR actual capacity comprising of helical rotary compressor/s with direct drive motor, insulated shell and tube type plain tube chiller, set/s of coil and air cooled condensers with aluminium fins complete with direct driven propeller fans with IP-55 protection. Each unit shall be complete with two independent refrigerant circuits. The chiller package shall also be complete with vibration isolation mountings, copper refrigerant piping , full charge of refrigerant gas and system control wiring, complete with accessories as required, automatic &amp; safety controls including electronic expansion valve. The chiller package shall be installed on a fabricated mild steel base frame factory assembled to form a compact assembly. The chiller package shall also be completed with micro processor based control panel comprising of all adaptive controls , indication lights, Star- Delta starters, over load &amp; control power transformer protection and necessary control wiring. The compressor shall be suitable for operation on <math>415 \pm 10\%</math> volts , 50 Hz, 3 phase, AC power supply.</p>			

ITEM	DESCRIPTION	UNIT	QTY.	RATE
	Chilled water leaving temperature : 44 deg F (6.7 deg C)			
	Chilled water entering temperature : 54 deg F (12.2 deg C)			
	Type of Refrigerant : R-134a /R-22			
	Permissible KW:TR ratio -- 1.2 (Maximum)			
	Chiller fouling factor : 0.0005			
	Air cooled chiller packages as described above	No	2	
1.2	<b>CHILLED WATER PUMPS</b>			
	Supply, installation, testing and commissioning of end suction type centrifugal pump sets factory assembled and tested for rated efficiency complete with motor, TEFC squirrel cage induction motor,common base frame, Flexible coupling, Coupling guard, mechanical seals,vibration arrangement and gland drain connections for recirculation of chilled water for the central air conditioning system as per the specifications. Quoted price shall be inclusive of insulation for pumps as per specifications and as required. The pumps shall be suitable for operation on $415 \pm 10\%$ Volts, 50 Hz, 3 Phase AC power supply. The pump characteristics shall be as follows :			
	a. Water flow rate : 264 USGPM (1000 LPM)			
	b. Head : 32 M			
	c. Permissible speed not exceeding :1450 RPM			
	End suction pumps as described above including one standby.	No	3	

ITEM	DESCRIPTION	UNIT	QTY.	RATE
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### 1.3 DOUBLE SKIN AIR HANDLING UNITS

#### VERTICAL AHUs

Supply, Installation Testing and Commissioning of double skin sheet metal construction air handling units with 48mm thick injected PU of density not less than 40Kg/CuM. The air handling units shall be complete with filter section with 50mm thick synthetic fibre filters, coil section with multirows deep chilled water cooling coil of copper tube and aluminium fin construction, fan section complete with floor standing forward curved DIDW centrifugal fan, belt drive package & squirrel cage induction motor, stainless steel drain pan and vibration isolation pads all complete as per the specifications. AHUs shall be selected for a maximum face velocity of 500 FPM and as per schedule of air handling units under appendix VIII. Fan outlet velocity shall not exceed 2000 FPM.

AHU No.	Capacity (Cfm)	SP (mm WG)	No. of Rows	Motor Rating (HP)
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#### WING-I

AH-1/Office -1F	7500	40	4	1x 7.5	No	1
AH-2/Seminar -1F	3500	38	6	1x 3	No	1
AH-3/Dining -1F	3500	38	6	1x 3	No	1
AH-4/Office -2F	7500	40	4	1x 7.5	No	1
AH-5/Conf/office -2F	5000	40	6	1x 5	No	1
AH-6/VIP Dining -2F	3000	38	6	1x 2	No	1
AH-7/Office -3F	7800	40	4	1x 7.5	No	1
AH-8/Office -3F	7800	40	4	1x 7.5	No	1
AH-9/Office -4F	7800	40	4	1x 7.5	No	1

ITEM	DESCRIPTION	UNIT	QTY.	RATE
AH-10/Office -4F	7800 40 4 1x 7.5	No	1	
AH-11/Office -5F	7800 40 4 1x 7.5	No	1	
AH-12/Office -5F	7800 40 4 1x 7.5	No	1	
AH-13/Office -6F	8250 40 4 1x 7.5	No	1	
AH-14/Office -6F	8250 40 4 1x 7.5	No	1	
<b>WING-II</b>				
AH-15/Dining -1F	5000 38 6 1x 5	No	1	

#### 1.4 FAN COIL UNITS

Supply , Installation , Testing and Commissioning of fan coil units each comprising of 3 rows deep chilled water cooling coil, centrifugal blowers, FHP motor, aluminium cleanable filters, insulated condensate drain pan, casing, insulated auxiliary condensate drain pan, coil piping connections, condensate drain connections & wiring. Fan coil units shall be suitable for operation on 240±10% Volts, 50Hz, single phase power supply of following sizes & capacities :

##### 1.4.1 Floor concealed fan coil units :

i. 1.0 TR nominal capacity with 400-500 CFM air quantity.	No	--
ii. 1.5 TR nominal capacity with 600-700 CFM air quantity.	No	--
iii. 2.0 TR nominal capacity with 800-900 CFM air quantity.	No	--
iv. 2.5 TR nominal capacity with 1000 - 1100 CFM air quantity.	No	--

ITEM	DESCRIPTION	UNIT	QTY.	RATE
1.4.2	<b>Ceiling concealed fan coil units :</b>			
	i. 1.0 TR nominal capacity with 400-500 CFM air quantity.	No	--	
	ii. 1.5 TR nominal capacity with 600-700 CFM air quantity.	No	--	
	iii. 2.0 TR nominal capacity with 800-900 CFM air quantity.	No	--	
	iv. 2.5 TR nominal capacity with 1000 - 1100 CFM air quantity.	No	--	
1.5	<b>EXPANSION TANK</b>			
	Supply, Installation and Testing of Chilled water expansion tank of 1Mx1Mx1M size complete with float valves, syphon scaled gauge, drain, over flow, make-up connections etc. Tank shall be fabricated out of 6mm thick MS plate duly insulated with 75mm thick "P" quality expanded polystyrene as per the specifications. The insulated surface shall be plastered ,cured and painted thereafter using approved colour and shade.The internal surface of the tank shall be coated with anti-corrosive paint.Quoted price shall be inclusive of foundation/MS frame as required.	No	1	

ITEM	DESCRIPTION	UNIT	QTY.	RATE
1.6	<p><b>SPLIT PACKAGES</b> <b>(For Server Rooms to operate during night)</b></p> <p>Supply, Installation, Testing &amp; Commissioning of split type airconditioning units, each comprising of an outdoor and single indoor unit. Condensing unit shall be complete with reciprocating compressor/s &amp; air cooled condenser with fan. Evaporating unit shall consist of a fan section with dynamically balanced centrifugal fans driven by FHP motor, multirows deep cooling coil of Copper tubes and aluminium fins, thermostatic expansion valves etc. Enclosures shall be fabricated as specified. The evaporating unit shall be equipped with synthetic fibre filters, insulated drain pan, safety controls, thermostat all complete in a unit. The enclosure shall be factory painted to a smooth finish. The quoted price shall be inclusive of full charge of refrigerant gas, vibration isolation pads and MS base frame duly painted with black enamel paint for mounting of condensing units. Quoted price shall be inclusive of insulated copper refrigerant piping laid on duly painted MS slotted angle cable trays and electrical work including cabling etc as required. Refrigerant piping shall be insulated with closed cell elastomeric insulation</p> <p><b>Single phase Non- ductable split units :</b></p> <p>a. 2.0 TR nominal capacity, split unit with single high wall non-ductable indoor unit with corded control including one standby</p>	No	7	

ITEM	DESCRIPTION	UNIT	QTY.	RATE
1.7	Supply, Installation, Testing and Commissioning of automatic voltage stabiliser for operation on 140-280 V supply with time delay relay.			
	a. 4 KVA Capacity	No	--	
	b. 5 KVA Capacity	No	7	

### 1.8 INLINE FANS

Supply Installation, Testing and commissioning of circular/rectangular inline fans for exhaust air as shown on drawings, complete with sheet metal casing, direct driven centrifugal fan, motor with proper protection and inspection door etc. as per the specifications. Fan should be suitable for operation on  $415 \pm 10\%$  volts, 50 Hz, three phase or  $240 \pm 10\%$ , 50 Hz, single phase AC power supply as required. Single phase inline fans shall be provided with speed regulators. Fan shall be suitable for installation in shaft or as shown on drawings and shall be of following capacities :

Fan No.	Capacity (Cfm)	SP (mmWG)	Electrical Characteristics	Area being Fed	Type	UNIT	QTY.
IF-1	500	10	240V/1 Ph.	L Toil (FF)	Circular	No	1
IF-2	500	10	240V/1 Ph.	G Toil (FF)	Circular	No	1
IF-3	500	10	240V/1 Ph.	L Toil (FF)	Circular	No	1
IF-4	500	10	240V/1 Ph.	G Toil (FF)	Circular	No	1
IF-5	500	10	240V/1 Ph.	Pantry (FF)	Circular	No	1
IF-6	1000	10	240V/1 Ph.	Pantry(FF)	Rectangular	No	1
IF-7	500	10	240V/1 Ph.	Pantry (FF)	Circular	No	1
IF-8	1000	10	240V/1 Ph.	Pantry(FF)	Rectangular	No	1
IF-9	700	10	240V/1 Ph.	Pantryl (SF)	Circular	No	1
IF-10	500	10	240V/1 Ph.	L Toil (SF)	Circular	No	1

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<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QTY.</b>	<b>RATE</b>
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ITEM	DESCRIPTION	UNIT	QTY.	RATE
IF-11	500 10 240V/1 Ph. G Toil (SF) Circular	No	1	
IF-12	500 10 240V/1 Ph. L Toil (TF) Circular	No	1	
IF-13	500 10 240V/1 Ph. G Toil (TF) Circular	No	1	
IF-14	500 10 240V/1 Ph. L Toil (4F) Circular	No	1	
IF-15	500 10 240V/1 Ph. G Toil (4F) Circular	No	1	
IF-16	500 10 240V/1 Ph. L Toil (5F) Circular	No	1	
IF-17	500 10 240V/1 Ph. G Toil (5F) Circular	No	1	
IF-18	500 10 240V/1 Ph. L Toil (6F) Circular	No	1	
IF-19	500 10 240V/1 Ph. G Toil (6F) Circular	No	1	

### 1.9 PROPELLER FANS

Supply, Installation, Testing and Commissioning of propeller fans for supply of fresh air and for exhaust air as shown on drawings. Each fan shall be complete with permanent split capacitor, mounting plate and accessories like wire guard, bird screen and gravity louvers for weather protection as required. Fan selection, arrangement and electrical characteristics shall be as follows :

a. 450 mm dia 900/1400 RPM fan suitable for  $240 \pm 6\%$  Volts, 50 Hz, single phase AC supply.

No --

b. 375 mm dia 900/1400 RPM fan suitable for  $240 \pm 6\%$  Volts, 50 Hz, single phase AC supply.

No --

c. 300 mm dia 900/1400 RPM fan suitable for  $240 \pm 6\%$  Volts, 50 Hz, single phase AC supply.

No 6

**TOTAL CARRIED TO SUMMARY (EQUIPMENT)**

**F Rs.**

ITEM	DESCRIPTION	UNIT	QTY.	RATE
2	<b>PIPING</b>			
2.1	<b>CHILLED WATER PIPING</b>			
	Providing and fixing in position the following MS heavy class pipes cut to required lengths and installed with all welded joints. Providing and fixing in position the necessary fittings like elbows, tees and reducers :			
	a. 150mm dia	RM	100	
	b. 125mm dia	RM	20	
	c. 100mm dia	RM	150	
	d. 75mm dia	RM	30	
	e. 65mm dia	RM	30	
	f. 50mm dia	RM	130	
	g. 40mm dia	RM	80	
	h. 30mm dia	RM	10	
	i. 25mm dia	RM	10	
	j. 20mm dia	RM	10	
2.2	Providing and fixing in position the following Butterfly Valves.			
	a. 150mm dia	No	3	
	b. 125mm dia	No	2	
	c. 100mm dia	No	10	
	d. 75mm dia	No	2	
	e. 65mm dia	No	2	
	f. 50mm dia	No	20	
	g. 40mm dia	No	8	
2.3	Providing and fixing in position the following Gate Valves.			
	a. 50mm dia	No	4	
	b. 40mm dia	No	2	
	c. 30mm dia	No	10	
	d. 25mm dia	No	30	
	e. 20mm dia	No	4	

<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QTY.</b>	<b>RATE</b>
f.	15mm dia	No	2	

ITEM	DESCRIPTION	UNIT	QTY.	RATE
2.4	Providing and fixing in position the following specified make balancing valves:			
	a. 150mm dia	No	--	
	a. 125mm dia	No	--	
	c. 100mm dia	No	2	
	d. 75mm dia	No	--	
	e. 65mm dia	No	--	
	f. 50mm dia	No	11	
	g. 40mm dia	No	4	
2.5	Providing and fixing in position the following check valves.			
	a. 125mm dia	No	--	
	b. 100mm dia	No	2	
2.6	Supply, Installation, Testing & commissioning of three way diverting valves with modulating Motor, transformer and copper control wiring for AHUs . Control wiring from AHU panel to valve shall be carried out in full co-ordination with the main electrical contractor.The valves shall be of the following sizes.			
	a. 65mm dia	No	--	
	b. 50mm dia	No	--	
	c. 40mm dia	No	11	
	d. 30mm dia	No	4	
2.7	Supply , Installation , Testing and Commissioning of Three way motorised valves of Honeywell make model V4044 or equivalent complete with thermostat, conduiting, wiring etc. for FCU's.			
	20mm dia valves	No	--	

ITEM	DESCRIPTION	UNIT	QTY.	RATE
2.8	Providing and fixing in position the following ball valves one with Y-strainer and other without strainer for FCUs.			
	a. 25mm dia valves	Sets	--	
	b. 20mm dia valves	Sets	--	
2.9	Providing and fixing in position the following globe valves for FCUs.			
	a. 25mm dia valves	No	--	
	b. 20mm dia valves	No	--	
2.10	Providing and fixing in position the following automatic purge valves.			
	a. 10mm dia	No	20	
2.11	Providing and fixing in position industrial type pressure gauges constructed out of SS 304 material. SS siphon shall be factory insulated with closed cell elastomeric insulation in tubing form.Pressure gauges shall be factory fitted with a ball valve at the tube.	No	40	
2.12	Providing and fixing in position V-form industrial type thermometers as per specifications.	No	34	
2.13	Providing and fixing in position the following 'Y' strainers.			
	a. 65mm dia	No	--	
	b. 50mm dia	No	11	
	c. 40mm dia	No	4	
	d. 30mm dia	No	--	
2.14	Providing and fixing in position the following pot strainers :			
	a. 200mm dia	No	1	

ITEM	DESCRIPTION	UNIT	QTY.	RATE
2.15	Providing and fixing in position the following GI medium class pipes for condensate drain cut to required lengths and installed with all screwed joints and providing and fixing in position the necessary elbows, tees & reducers.			
	a. 50mm dia	RM	40	
	b. 40mm dia	RM	30	
	c. 25mm dia	RM	30	
2.16	Supply and Installation of neoprene rubber expansion belows with integral reinforced rubber flanges on both sides at inlet and outlet of water recirculation pumps and chiller packages of approved make.			
	a. 125mm dia	No	--	
	b. 100mm dia	No	10	
2.17	Providing and fixing in position of approved make pressure differential switches complete with copper control wiring at chilled water outlet of each chiller package.	Sets	2	

**TOTAL CARRIED TO SUMMARY (PIPING)**

**Rs.**

ITEM	DESCRIPTION	UNIT	QTY.	RATE
3	<b>AIR DISTRIBUTION</b>			
3.1	Supply, Fabrication , Installation and Testing of galvanised sheet metal ducts in accordance with the approved shop drawings and specifications.			
	a. 0.63mm (24 gauge) GSS	SqM	1750	
	b. 0.8 mm (22 gauge) GSS	SqM	900	
	c. 1.0mm (20 gauge) GSS	SqM	20	
	d. 1.25mm (18 gauge) GSS	SqM	20	
3.2	Supply, Installation , Testing of 125mm deep antivibration flexible joints made out of imported fire retardant fabric with extruded aluminium frame/flange on both sides of approved make.	RM	70	
3.3	Supply, Installation and Testing of multi blade type louver dampers of galvanised steel sheet for collars to be provided with suitable links, levers and quadrants for manual control of volume of air flow and for proper balancing of the air distribution system as per the approved shop drawings and specifications.	SqM	25	
3.4	Supply, Installation and Testing of multiblade box type galvanised steel sheet dampers for ducts to be provided with suitable links, levers and quadrants for manual control of volume of air flow and for proper balancing of the air distribution system as per the approved shop drawings and specifications.	SqM	10	

ITEM	DESCRIPTION	UNIT	QTY.	RATE
3.5	Supply, Installation, Testing and Commissioning of fire dampers of at least 90 minutes fire rating as per the approved shop drawings and specifications.			
	a. Bare fire dampers	SqM	20	
	b. Actuator with control panel & temperature sensor but with spring return action.	No	55	
3.6	Supply, Installation, Testing and Balancing of double louvered supply air grilles in accordance with the approved shop drawings. Each grille shall be provided with individually adjustable air distribution pattern, air distribution grid, for straightening the air flow through the collar and removable key-operated volume control dampers :			
	a. Powder coated extruded aluminium grilles.	SqM	--	
3.7	Supply, Installation and Testing of double louvered grilles same as supply air grilles but without volume control dampers for return/exhaust air in accordance with the approved shop drawings and specifications.			
	a. Powder coated extruded aluminium grilles.	SqM	--	

ITEM	DESCRIPTION	UNIT	QTY.	RATE
3.8	Supply, Installation , Testing and Balancing of square supply/exhaust air diffusers as per the approved shop drawings and specifications. Each diffuser shall be equipped with fixed air distribution grid , removable key-operated volume control damper. The diffusers shall be anti-smudge ring type.			
	a. Powder coated extruded aluminium diffusers of approved colour & shade.	SqM	15	
3.9	Supply, Installation , Testing and Balancing of square return air diffusers same as supply air diffusers but without volume control dampers as per the approved shop drawings and specifications.			
	a. Powder coated extruded aluminium diffusers of approved colour & shade.	SqM	18	
3.10	Supply, Installation , Testing and Balancing of one way blow linear supply cum return air grilles complete with removable inner core as per approved shop drawing and specifications. The grilles shall be of approved colour & shade.			
	a. Powder coated aluminium grille of extruded sections with integral flanges on both sides & ends as required.			
	i. 100/150/200 mm High	SqM	65	

ITEM	DESCRIPTION	UNIT	QTY.	RATE
3.11	Supply, Installation , Testing and Balancing of one way blow curved linear supply cum return air grilles complete with removable/fixed inner core as per approved shop drawing and specifications. The grilles shall be of approved colour & shade.			
	a. Powder coated aluminium grille of extruded sections with integral flanges on both sides & ends as required.			
	i. 100/150/200 mm High	SqM	10	
3.12	Supply, Installation ,Testing and Balancing of multi-slot type linear slot diffusers as per the approved shop drawings and specifications. Each diffuser shall be complete with ' HIT & MISS' type extruded aluminium dampers at supply air portions.			
	a. Powder coated extruded aluminium diffusers of approved colour & shade.			
	i. 100/150 mm wide	SqM	--	
3.13	Supply, Installation and Testing of fresh air grilles of powder coated / anodised extruded aluminium with filters, inlet louvers dampers and bird screen, as per approved shop drawings and specifications.			
		SqM	3	
3.14	Supply, Installation and Testing of extruded aluminium powder coated air transfer grilles to be provided at the door of toilets and pantry/kitchen.			
		SqM	2	

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<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QTY.</b>	<b>RATE</b>
<b>TOTAL CARRIED TO SUMMARY (AIR DISTRIBUTION)</b>		<b>Rs.</b>		

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ITEM	DESCRIPTION	UNIT	QTY.	RATE
4	<b>INSULATION</b>			
4.1	Supply and Application of acoustic lining/ internal thermal insulation of supply/return air ducting with fibre glass insulation as per the specifications and drawings.			
	a. 50mm thick	SqM	--	
	b. 25mm thick	SqM	180	
4.2	Supply and Application of external thermal insulation of ducting using closed cell elastomeric insulation with adhesive, longitudinal & transverse joints sealed with self adhesive tape of same material.			
	a. 16mm thick	SqM	100	
	b. 9 mm thick	SqM	2200	
4.3	Supply and Application of 25mm thick closed cell elastomeric insulation in tubing form /flat sections for chilled water piping as per the specifications. Quoted price shall be inclusive of adhesive as per specifications.Joints shall be sealed with self adhesive tape of same material.			
	a. 150mm dia	RM	--	
	b. 125mm dia	RM	20	
	c. 100mm dia	RM	140	
	d. 75mm dia	RM	20	
	e. 65mm dia	RM	30	
	f. 50mm dia	RM	130	
	g. 40mm dia	RM	80	
	h. 30mm dia	RM	10	
	i. 25mm dia	RM	10	

ITEM	DESCRIPTION	UNIT	QTY.	RATE
4.4	Supply and Application of 75mm thick "P" quality expanded polystyrene insulation in pipe sections covered with 24 G aluminium cladding for chilled water piping on terrace as per the specifications.			
	a. 150mm dia	RM	100	
	b. 125mm dia	RM	10	
	c. 100mm dia	RM	50	
	d. 75mm dia	RM	10	
	e. 65mm dia	RM	--	
4.5	Supply and Application of 9 mm thick closed cell elastomeric insulation in tubing form for condensate drain piping as per the specifications.			
	a. 50mm dia	RM	40	
	b. 40mm dia	RM	30	
	c. 25mm dia	RM	30	
4.6	Supply and Application of thermal/ acoustic lining of walls & ceiling of AHU rooms using fibre glass insulation mounted on a suitable frame work made out of GI sheet channels, covered with RP tissue and finished with 24 gauge perforated aluminium sheet as per the specifications.			
	a. 50mm thick	SqM	50	
	b. 25mm thick	SqM	550	
4.7	Supply and Application of 50mm thick insulation for supply air ducts exposed to atmosphere on terrace and within shafts as per specifications.			
		SqM	--	
<b>TOTAL CARRIED TO SUMMARY (INSULATION)</b>				<b>Rs.</b>

ITEM	DESCRIPTION	UNIT	QTY.	RATE
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5      **ELECTRICAL INSTALLATION**

**Note :**

Entire electrical work associated with the HVAC system including supply and installation of MCC, AHU panels, power cabling, earthing etc. shall be covered in the main Electrical Package and installation shall be carried out by the Electrical Contractor in full co-ordination with the HVAC contractor.

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