



DESIGN QUALIFICATION PROTOCOL FOR HVAC SYSTEM OF AHU-01

CUSTOMER:

PROJECT:

SUBMITTED BY:

PHARMA ENGINEERS

PLOT NO. 113/A/1, LANE 8, PHASE II,
IDA CHERLAPALLI, HYDERABAD- 500051.

Tel No.91-40 27261113, 27261114

DESIGN QUALIFICATION PROTOCOL APPROVAL

This document is prepared by the documentation team of **M/S. PHARMA ENGINEERS** for

AHU TAG Number : AHU-01

PLANT /PROJECT :

CLIENT :

Hence this document before being effective shall be approved by *M/s.(Client / Customer)*

M/s. PHARMA ENGINEERS:

	Name	Designation	Signature	Date
Prepared By				
Reviewed By				

CLIENT / CUSTOMER:

	Name	Designation	Signature	Date
Reviewed By				
Approved By				

Client:
Supplier/ Manufacturer: PHARMA ENGINEERS, HYDERABAD

Equipment: HVAC SYSTEM FOR AHU-01

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DESIGN QUALIFICATION (DQ)

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1. OBJECTIVE

The objective of this document is to comply with **URS** Document Number:
_____ pertaining to design specification of HVAC System
AHU-01

2. SCOPE

Design Specifications of HVAC System Comprising of the following main Equipments.

- Air Handling Unit
- Dehumidifier
- Terminal Filters
- Diffusers
- Grills
- Ducting
- Insulation
- Manifolds
- PID Panel
- Instrumentation

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3. RESPONSIBILITIES

M/s. Pharma Engineers:

1. Shall agree and follow the URS.
2. To Prepare the detailed engineering drawings.
3. To submit the technical details of HVAC system as per the scope of supply.
4. To ensure safe delivery of equipment
5. To Complete the hvac system qualification.



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4. SYSTEM DESCRIPTION

AHU is of recirculated type and made from double skin panels filled with PUF insulation density of 48 kg/m³ and assembled as a closed box with Aluminum profiles. Profiles are fitted with thermal barrier to avoid condensation over it. AHU is provided with a stainless-steel drain tray for collection of condensate.

AHU is sized to accommodate different sections like mixing chamber, cooling coil, Heating coil, fan motor assembly, First stage (F-9), Second stage(H-14), Third stage(F-7), Final stage(F-9).

All the filters are provided with specific distant from Motor Blower assembly and thus the operator is protected during maintenance. Blower assembly is provided with anti vibrator spring isolators to minimize the vibration to AHU.

Access doors are provided for each section and door locks are provided with gasket, to avoid leakages from the doors.

AHU-06 is provided with manual type volume control dampers at supply air outlet, return air inlet and fresh air inlet. Fire dampers with actuator shall be provided which works on the feedback from smoke sensor present in return duct.

The total volume of air is supplied to the process areas with the help of supply duct, which is made up of GI sheet and the air returns to the mixing chamber through the return duct which is made up of GI sheet.

An air distribution system is provided to supply the air, delivered by the blowers into the working areas through Terminal Hepa filters. By using the same system, return air flows back to the air handling unit through Return raisers to maintain certain pressure gradients, temperature and targeted clean classification level.

Dampers shall be at each outlet / terminal point and at each pickup point. Balancing dampers shall be provided at each branch from the main duct to adjust the airflow as per requirement. Duct is insulated (XLPE) with cross linked polyolefin foam of 19 mm thick for supply air duct and 13 mm thick for return air duct.

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5. SYSTEM ARCHITECTURE

Details of areas covered by AHU-01 are as follows:

Areas Covered	Designed Class (@ rest)	Minimum ACPH	Temp °C	RH%	Room Pressure w.r.t Ambient (Pa)



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6. TECHNICAL SPECIFICATIONS:

**AHU (SUPPLY UNIT) / AHU (RETURN UNIT) / EXHAUST UNIT /
AHU CUM DEHUMIDIFIER**

NOMENCLATURE:	
Tag No.	AHU-01
Manufacturers name	M/S PHARMA ENGINEERS
Qty	01 No.
Unit Model	AHU-01
Capacity (CFM)	6000 CFM
Static Pressure (MM)	220 mm of WC
Process Blower Make	KRUGER / NICOTRA GEBHARDT
Process Blower Model	RLO-51-4550-D38
Process Blower Speed (RPM)	2850 RPM
Reactivation Blower Make	NICOTRA GEBHARDT
Reactivation Blower Model	RLO-11-2528-D19
Process Motor Make	CROMPTON GREAVES/SIEMENS
Process Motor Capacity (K.W/ HP)	11 KW / 15 HP
Process Motor Speed (RPM)	2900 RPM
Reactivation Motor Make	CROMPTON GREAVES/SIEMENS
Reactivation Motor Capacity (K.W/ HP)	0.75 KW/1.0 HP
Motor Make	BB/CG
Motor Capacity (K.W)	5.5
Poles	4 Pole / 2 Pole
Motor Speed(RPM)	2900 RPM / 1440 RPM
CONSTRUCTION DETAILS:	
Overall dimensions (L X W X H) (MM)	4864x1750x2055
Type	Double Skin Thermal Break Type
M.O.C of Drain Tray	SS 304
Plenums Outer skin(MM)	0.8 mm PP GS sheet.
Plenums Inner skin(MM)	0.6 mm PP GS sheet.
Panel thickness(MM)	43±0.5 mm
M.O.C of Frame work	Aluminum Extruded Profile
M.O.C of Base of the unit	14G G.S Sheet Plain
CENTRIFUGAL FAN:	
Make	KRUGER / NICOTRA GEBHARDT

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Model	BNB-P400
Air Flow	3000 CFM
Static Pressure	210 mm of WC
Type	PLUG FAN / DIDW
Fan Pulley	
V- Belt	
R.P.M	3103 RPM
MOTOR:	
Make	BB/CG/SIEMENS
K. W	5.5
Motor Pulley	
No. of Poles	2 / 4
RPM	2900 RPM / 1440 RPM
Type	Flame Proof / Non-Flame Proof
ACCESSORIES:	
Service Lamp	Weather proof Lamp
On/Off Switch for Lamp	1no.
Limit Switch for Door	1no.
DEHUMIDIFIER BED CONSTRUCTIONAL DETAILS:	
Manufacturers name	BryAir / Air Pack
Air flow handling capacity of dehumidifier	2000 CFM
Revolution per Hour	20
MOC	Super silica rotor (DMR)
BED MOTOR	
Make	T.W.T.
Type	Induction motor
Power	90W/440V
RPM	3
REACTIVATION BLOWER	
Type	Backward
Blower Model	RLO-315
Air Flow	667 CFM
REACTIVATION MOTOR	
Make	Crompton Greaves
Type	Tefc Sq cage Induction flange mounted
Rating	1.5 HP

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No. of Poles	2
RPM	2880
FILTRATION SCHEME WITH IN AHU & ACD	
FILTRATION IN ACD	
REACTIVATION FILTER	
Make	THERMODYNE / AAF
Type of filter	Flange type
Filter Media	Synthetic
Compatibility of water wash	Yes
Filter Test method	EN 779
Filter classification as per EN 779	G-3
Average arrestance of synthetic dust	$80 \leq Am < 90$
Equivalent particle size in terms of market language	20 micron-Un authenticated data
I.P.D of Filter (Approximate)	55 ± 10 Pa
F.P.D of Filter (Approximate)	250 Pa
Size of Filter / Rated Air flow	610 x 610 x 50 / 2000 CFM
Qty	
Size of Filter / Rated Air flow	610 x 305 x 50 / 1000 CFM
Qty	
Size of Filter / Rated Air flow	305 x 305 x 50 / 500 CFM
Qty	
NOTE: I.P.D & F.P.D values change based on AIRFLOW; hence customer should set the limits after commissioning.	
FILTRATION AHU	
FIRST STAGE FILTRATION IN AHU	
Make of Filter	THERMODYNE / AAF
Type of filter	Flange type
Filter Media	Synthetic
Compatibility of water wash	Yes
Filter Test method	EN 779
Filter classification as per EN 779	G-3
Average arrestance of synthetic dust	$80 \leq Am < 90$
Equivalent particle size in terms of market language	20 micron-Un authenticated data
I.P.D of Filter (Approximate)	55 ± 10 Pa
F.P.D of Filter (Approximate)	250 Pa
Size of Filter / Rated Air flow	610 x 610 x 50 / 2000 CFM
Qty	
Size of Filter / Rated Air flow	610 x 305 x 50 / 1000 CFM

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Qty	
Size of Filter / Rated Air flow	305 x 305 x 50 / 500 CFM
Qty	
NOTE: I.P.D & F.P.D values change based on AIRFLOW; hence customer should set the limits after commissioning.	
FIRST STAGE FILTRATION IN AHU	
Make of Filter	THERMODYNE / AAF
Type of filter	Flange type
Filter Media	Synthetic
Compatibility of water wash	Yes
Filter Test method	EN 779
Filter classification as per EN 779	G-4
Average arrestance of synthetic dust	$90 \leq Am$
Equivalent particle size in terms of market language	10 micron-Un authenticated data
I.P.D of Filter (Approximate)	65 ± 10 Pa
F.P.D of Filter (Approximate)	250 Pa
Size of Filter / Rated Air flow	610 x 610 x 50 / 2000 CFM
Qty	
Size of Filter / Rated Air flow	610 x 305 x 50 / 1000 CFM
Qty	
Size of Filter / Rated Air flow	305 x 305 x 50 / 500 CFM
Qty	
NOTE: I.P.D & F.P.D values change based on AIRFLOW; hence customer should set the limits after commissioning.	
SECOND STAGE FILTRATION IN AHU	
Make of Filter	THERMODYNE / AAF
Type of filter	Flange type
Filter Media	Synthetic
Compatibility of water wash	Yes
Filter Test method	EN 779
Filter classification as per EN 779	M-5
Average efficiency at 0.4 micron	$40 \leq Em < 60$
Equivalent particle size in terms of market language	5 micron-Un authenticated data
I.P.D of Filter for 150 mm thick (Approximate)	90 ± 10 Pa
I.P.D of Filter for 300 mm thick (Approximate)	75 ± 10 Pa
F.P.D of Filter (Approximate)	450 Pa

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Size of Filter / Rated Air flow	610 x 610 x 150 / 2000 CFM
Qty	
Size of Filter / Rated Air flow	610 x 305 x 150 / 1000 CFM
Qty	
Size of Filter / Rated Air flow	305 x 305 x 150 / 500 CFM
Qty	
Size of Filter / Rated Air flow	610 x 610 x 300 / 2000 CFM
Qty	
Size of Filter / Rated Air flow	610 x 305 x 300 / 1000 CFM
Qty	
Size of Filter / Rated Air flow	305 x 305 x 300 / 500 CFM
Qty	
NOTE: I.P.D & F.P.D values change based on AIRFLOW; hence customer should set the limits after commissioning.	
SECOND STAGE FILTRATION IN AHU	
Make of Filter	THERMODYNE / AAF
Type of filter	Flange type
Filter Media	Synthetic
Compatibility of water wash	Yes
Filter Test method	EN 779
Filter classification as per EN 779	M-6
Average efficiency at 0.4 micron	$60 \leq E_m < 80$
Equivalent particle size in terms of market language	5 micron-Un authenticated data
I.P.D of Filter for 150 mm thick (Approximate)	110 ± 10 Pa
I.P.D of Filter for 300 mm thick (Approximate)	90 ± 10 Pa
F.P.D of Filter (Approximate)	450 Pa
Size of Filter / Rated Air flow	610 x 610 x 150 / 2000 CFM
Qty	
Size of Filter / Rated Air flow	610 x 305 x 150 / 1000 CFM
Qty	
Size of Filter / Rated Air flow	305 x 305 x 150 / 500 CFM
Qty	
Size of Filter / Rated Air flow	610 x 610 x 300 / 2000 CFM
Qty	
Size of Filter / Rated Air flow	610 x 305 x 300 / 1000 CFM
Qty	
Size of Filter / Rated Air flow	305 x 305 x 300 / 500 CFM

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Qty	
NOTE: I.P.D & F.P.D values change based on AIRFLOW; hence customer should set the limits after commissioning.	
SECOND STAGE FILTRATION IN AHU	
Make of Filter	THERMODYNE / AAF
Type of filter	Flange type
Filter Media	Synthetic
Compatibility of water wash	Yes
Filter Test method	EN 779
Filter classification as per EN 779	F-7
Average efficiency at 0.4 micron	$80 \leq Em < 90$
Equivalent particle size in terms of market language	3 micron-Un authenticated data
I.P.D of Filter for 150 mm thick (Approximate)	160 ± 10 Pa
I.P.D of Filter for 300 mm thick (Approximate)	120 ± 10 Pa
F.P.D of Filter (Approximate)	450 Pa
Size of Filter / Rated Air flow	610 x 610 x 150 / 2000 CFM
Qty	
Size of Filter / Rated Air flow	610 x 305 x 150 / 1000 CFM
Qty	
Size of Filter / Rated Air flow	305 x 305 x 150 / 500 CFM
Qty	
Size of Filter / Rated Air flow	610 x 610 x 300 / 2000 CFM
Qty	
Size of Filter / Rated Air flow	610 x 305 x 300 / 1000 CFM
Qty	
Size of Filter / Rated Air flow	305 x 305 x 300 / 500 CFM
Qty	
NOTE: I.P.D & F.P.D values change based on AIRFLOW; hence customer should set the limits after commissioning.	
THIRD STAGE FILTRATION IN AHU	
Make of Filter	THERMODYNE / AAF
Type of filter	Flange type
Filter Media	Micro Fiber Glass
Compatibility of water wash	No
Filter Test method	EN 779
Filter classification as per EN 779	F-9
Average efficiency at 0.4 micron	$95 \leq Em$

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Equivalent particle size in terms of market language	1 micron-Un authenticated data
I.P.D of Filter for 150 mm thick (Approximate)	120 ± 10 Pa
I.P.D of Filter for 300 mm thick (Approximate)	180 ± 10 Pa
F.P.D of Filter (Approximate)	500 Pa
Size of Filter / Rated Air flow	610 x 610 x 150 / 1000 CFM @ 1.25 m/s
Qty	
Size of Filter / Rated Air flow	610 x 305 x 150 / 500 CFM @ 1.25 m/s
Qty	
Size of Filter / Rated Air flow	305 x 305 x 150 / 247 CFM @ 1.25 m/s
Qty	
Size of Filter / Rated Air flow	610 x 610 x 300 / 2000 CFM @ 2.5 m/s
Qty	
Size of Filter / Rated Air flow	610 x 305 x 300 / 1000 CFM @ 2.5 m/s
Qty	
Size of Filter / Rated Air flow	305 x 305 x 300 / 500 CFM @ 2.5 m/s
Qty	
NOTE: I.P.D & F.P.D values change based on AIRFLOW; hence customer should set the limits after commissioning.	
TERMINAL STAGE FILTRATION IN AHU (PLENUM)	
Make of Filter	THERMODYNE / AAF
Type of filter	Flange type
Filter Media	Micro Fiber Glass
Compatibility of water wash	No
Filter Test method	EN 1822
Filter classification as per EN 779	H-13
Average Efficiency at MPPS	99.95%
Equivalent particle size in terms of market language	0.3 micron-Un authenticated data
I.P.D of Filter for 150 mm thick (Approximate)	350 ± 10 Pa
I.P.D of Filter for 292 mm thick (Approximate)	350 ± 10 Pa
F.P.D of Filter (Approximate)	750 Pa
Size of Filter / Rated Air flow	610 x 610 x 150 / 1000 CFM @ 1.25 m/s
Qty	
Size of Filter / Rated Air flow	610 x 305 x 150 / 500 CFM @ 1.25 m/s
Qty	

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Size of Filter / Rated Air flow	305 x 305 x 150 / 245 CFM @ 1.25 m/s
Qty	
Size of Filter / Rated Air flow	610 x 610 x 292 / 2000 CFM @ 2.5 m/s
Qty	
Size of Filter / Rated Air flow	610 x 305 x 292 / 1000 CFM @ 2.5 m/s
Qty	
Size of Filter / Rated Air flow	305 x 305 x 292 / 500 CFM @ 2.5 m/s
Qty	
NOTE: I.P.D & F.P.D values change based on AIRFLOW; hence customer should set the limits after commissioning.	
TERMINAL STAGE FILTRATION IN AHU (PLENUM)	
Make of Filter	THERMODYNE / AAF
Type of filter	Flange type
Filter Media	Micro Fiber Glass
Compatibility of water wash	No
Filter Test method	EN 1822
Filter classification as per EN 779	H-14
Average Efficiency at MPPS	99.995%
Equivalent particle size in terms of market language	0.3 micron-Un authenticated data
I.P.D of Filter for 150 mm thick (Approximate)	350 ± 10 Pa
I.P.D of Filter for 292 mm thick (Approximate)	350 ± 10 Pa
F.P.D of Filter (Approximate)	750 Pa
Size of Filter / Rated Air flow	610 x 610 x 150 / 1000 CFM @ 1.25 m/s
Qty	
Size of Filter / Rated Air flow	610 x 305 x 150 / 500 CFM @ 1.25 m/s
Qty	
Size of Filter / Rated Air flow	305 x 305 x 150 / 245 CFM @ 1.25 m/s
Qty	
Size of Filter / Rated Air flow	610 x 610 x 292 / 2000 CFM @ 2.5 m/s
Qty	
Size of Filter / Rated Air flow	610 x 305 x 292 / 1000 CFM @ 2.5 m/s
Qty	
Size of Filter / Rated Air flow	305 x 305 x 292 / 500 CFM @ 2.5 m/s
Qty	
NOTE: I.P.D & F.P.D values change based on AIRFLOW; hence customer should set the limits after commissioning.	
FRESH AIR FILTRATION IN AHU/ PRECOOLING	

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Make of Filter	
Type of filter	
Filter Media	
Compatibility of water wash	
Filter Test method	
Filter classification as per EN 779	
Average arrestance of synthetic dust	
Equivalent particle size in terms of market language	
Size of Filter / Rated Air flow	
Qty	
BLEED AIR FILTRATION IN AHU	
Make of Filter	
Type of filter	
Filter Media	
Compatibility of water wash	
Filter Test method	
Filter classification as per EN 779	
Average arrestance of synthetic dust	
Equivalent particle size in terms of market language	
Size of Filter / Rated Air flow	
Qty	
COOLING, HEATING WITH IN AHU / ACD	
COOLING COIL IN TFA	
Manufacturers name	M/s. Flakt Woods (India) Pvt. Ltd. Hyderabad Coils Pvt Ltd
Quantity	1 No.
Fluid	Chilled water
Coil size (fin ht. x fin Length)	635 x 860 mm
No. of Rows	6
Tube MOC	Copper
Tube Diameter	1/2"
Fins MOC	Aluminum
COOLING COIL IN AHU	
Manufacturers name	M/s. Flakt Woods (India) Pvt. Ltd. Hyderabad Coils Pvt Ltd
Quantity	1 No.
Fluid	Chilled water
Coil size (fin ht. x fin Length)	635 x 860 mm

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No. of Rows	6
Tube MOC	Copper
Tube Diameter	1/2"
Fins MOC	Aluminum
HEATING COIL IN AHU	
Manufacturers name	M/s. Flakt Woods (India) Pvt. Ltd. Hyderabad Coils Pvt Ltd
Quantity	1 No.
Fluid	Hot water
Coil size (fin ht. x fin Length)	635 x 860 mm
No. of Rows	2
Tube MOC	Copper
Tube Diameter	1/2"
Fins MOC	Aluminum
STEAM COIL IN ACD	
Manufacturers name	M/s. Flakt Woods (India) Pvt. Ltd. Hyderabad Coils Pvt Ltd
Quantity	1 No.
Fluid	Steam
Coil size (fin ht. x fin Length)	635 x 860 mm
No. of Rows	6
Tube MOC	Copper
Tube Diameter	5/8"
Fins MOC	Aluminum
DETAILS OF VOLUME CONTROL DAMPERS FOR AHU:	
Make	M/s. Flakt Woods (India) Pvt. Ltd. M/s. System Air M/s. Pharma Engineers
MOC	Aluminum extruded aero foil design
Supply Air	325x550 mm-1 No.
Return Air	325x550 mm-1 No..
Fresh Air	300x600 mm- 1 No.
Bleed Air	300x300 mm- 1 No.
DETAILS OF FUSIBLE LINK FIRE DAMPERS FOR AHU:	
Make	M/s. System Air M/s. Pharma Engineers
Type	Multi-blade low leakage with opposed blade
Blades & Casing	1.6mm thick GSS / 1.6 mm thick GI sheet
Fire Rating @ IP 555	120min Fire Rating

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Melting point of fusible link	74 deg. C
Limit switch	Mounted on frame of damper
Supply Duct	550x325 mm
Return Duct	550x325 mm
Exhaust Duct	550x325 mm
DETAILS OF MOTORIZED FIRE DAMPERS FOR AHU:	
Make	M/s. System Air M/s. Pharma Engineers
MOC	GI
Thickness	16G
Rating @ IP 555	120min Fire Rated
Supply Duct	550x325 mm
Return Duct	550x325 mm
Exhaust Duct	
ACTUATOR FOR FIRE DAMPER:	
Make	M/S. Belimo
Model	NFA-S2
Power supply	AC 24V 50Hz
Location	Return Air Duct, Supply Duct
PIPPING & MANIFOLD DETAILS	
CHILLED WATER MANIFOLD:	
Pipe Size	32 mm
Pipe Material	MS
PIPE INSULATION	
Make	kflex
Material	Elastomeric Nitrile rubber
Fire performance	Class 'O' (FM APPROVED)
Thickness	25 mm
Temperature range (maximum & minimum)	105°C & -40°C
Thermal conductivity at 20°C	0.036 w/m degK
3Way Valve with Actuator	
Make	Honeywell / Siemens
Valve Model Number	V5013P1010
Actuator model number	ML74208088-E

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Size	25 mm
Qty	1no.
Ball Valves	
Make	L&T or its equivalent
Size	32 mm
Qty	6 Nos.
Balancing Valves	
Make	Advance or its equivalent
Size	32 mm
Qty	1No.
Strainer	
Make	Creative/Zoloto or its equivalent
Size	32 mm
Qty	1No.
Drain Valve	
Make	Zoloto/L&T or its equivalent
Size	20 mm
Qty	1No.
Air Vent Valve	
Make	Anergy or its equivalent
Size	15 mm
Test port	
Make	Anergy or its equivalent
Size	8mm
HOT WATER MANIFOLD:	
Pipe Size	25 mm
Pipe Material	MS
PIPE INSULATION	
Make	kflex
Material	Elastomeric Nitrile rubber
Fire performance	Class 'O' (FM APPROVED)
Thickness	25 mm
Temperature range (maximum & minimum)	105°C & -40°C
Thermal conductivity at 20°C	0.036 w/m degK
2 WAY VALVE WITH ACTUATOR	
Make	Honeywell /Siemens
Model Number	V5011P1004
Actuator model number	ML74208088-E

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Size	25 mm
Qty	1no.
Ball Valves	
Make	L&T or its equivalent
Size	25 mm
Qty	5 Nos.
Balancing Valves	
Make	Advance or its equivalent
Size	25 mm
Qty	1No.
Strainer	
Make	Creative /Zoloto or its equivalent
Size	25 mm
Qty	1No.
Drain Valve	
Make	Zoloto/L&T or its equivalent
Size	20 mm
Qty	1No.
Air Vent Valve	
Make	Anergy or its equivalent
Size	15 mm
Test port	
Make	Anergy or its equivalent
Size	8mm
PRE-COOLIG COIL MANIFOLD	
Manufacturers name	M/s. Hyderabad Coils
Serving to	AHU - FRESH AIR
No. of Rows	4
Coil size (fin Width. X fin height)	24" X 24"
Fins/ Inch	12 FPI
Fins MOC	Aluminum
Size of manifold	40 NB
Pipe Material of manifold	MS
Make of Ball Valves	L&T or its equivalent
Qty	2 Nos
Make of Strainer	Marck or its equivalent
Size	40 mm
Qty	01 No's

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Make of Balancing Valve	Advance
Size	40 mm
Qty	01 No's
POST HEATING COIL MANIFOLD	
Manufacturers name	M/s. Hyderabad Coils
Serving to	AHU- FRESH AIR
No. of Rows	2
Coil size (fin Width. X fin height)	24" X 24"
Fins/ Inch	12 FPI
Fins MOC	Aluminum
Size of manifold	40 NB
Pipe Material of manifold	MS
Make of Ball Valves	L&T or its equivalent
Qty	2 Nos
Make of Strainer	Marck or its equivalent
Size	40 mm
Qty	01 No's
Make of Balancing Valve	Advance or its equivalent
Size	40 mm
Qty	01 No's
HEATERS	
Make	
Type	
Capacity	
THYRISTOR HEATING MODULE	
Make	M/s Pharma Engineers
Qty	01 No's
Type	Double Skin Thermal Break Type
Model	TH-45
Location	At service floor
Overall dimensions (L X W X H) (MM)	
Capacity	45 KW
Plenums Outer skin(MM)	0.8 mm PP GS sheet.
Plenums Inner skin(MM)	0.6 mm PP GS sheet.
Panel thickness(MM)	43±0.5 mm
HVAC ELECTRICAL PANEL (CENTRALIZED)	
Make	M/s. PHARMA ENGINEERS

Client:
Supplier/ Manufacturer: PHARMA ENGINEERS, HYDERABAD

Equipment: HVAC SYSTEM FOR AHU-01

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DESIGN QUALIFICATION (DQ)

Type	Compartmental
Location	
Cable Entry	Top
Power Supply	
Centralized Indication	KWH / Volts / Amps / meter
Cooling facility	Through inbuilt fan
Visual Indication	For VFD , ON , OFF, Trip ,Manual / Auto
MCB / MCCB Capacity	
HVAC ELECTRICAL PANEL (STAND ALONE)	
Make	M/s. PHARMA ENGINEERS
Type	
Location	
Cable Entry	Top
Power Supply	
Cooling facility	Through inbuilt fan
Visual Indication	For VFD , ON , OFF, Trip ,Manual / Auto
MCB / MCCB Capacity	
CABLES	
Make	Polycab
Conductor	Copper / Aluminum
Insulation	PVC
CABLE TRAY	
Make	PHARMA ENGINEERS
Thickness of sheet	2mm
Perforation of Tray	Ladder Type
Height of Cable Tray	50mm
VARIABLE FREQUENCY DRIVE	
Make	Danfoss
Model	VLT HVAC basic Drive FC101
VFD Capacity (KW) for supply unit	3.7 K. W
VFD Capacity (KW) for return unit	3.7 K. W
Voltage	3x380-480V

Client:
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DESIGN QUALIFICATION (DQ)

Control input	4-20mA/0-10V DC
INSTRUMENTATION DETAILS	
MAGNEHELIC GAUGES	
Make	Dwyer, U.S.A.
Accuracy	±2% of full scale
Dial size	4"
Material of Construction	die cast aluminum
Model Number	2000
Location	AHU prefilter
Range	0-25mm
Qty	1 No's
Location	AHU fine filter
Range	0-50mm
Qty	1 No's
Location	AHU plenum HEPA Filter
Range	0-50mm
Qty	1 No's
Location	Rooms
Range	0-60 Pa
Qty	5 No's
SENSOR DETAILS	
TEMPERATURE & RH SENSOR	
Make	
Model	
Type	
Range	
Location	
Qty	
DPT SENSOR	
Make	
Model	
Type	

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DESIGN QUALIFICATION (DQ)

Range	
Location	
Qty	
VELOCITY SENSOR	
Make	
Model	
Type	
Range	
Location	
Qty	
DUCTING:	
Material	Galvanized steel sheet
Manufacturer	JINDAL / TATA/SAIL/UTTAM/ESSAR
Zinc Coating thickness	120 GSM
Fabrication standard/Year	IS 655/2012
Duct leak test standard (only for Classified AHU's)	SMACNA 2012
Duct seal class	C
Duct leak testing pressure	2" W.G
Thickness of Galvanized sheet	Up to 750 mm - 24 G 751 to 1520 mm - 22 G 1521 to 2285 mm - 20 G Above 2285 mm - 18 G
Type of Gasket	Rubber based gasket
Supporting Rods	8 mm G.I threaded rod
Duct joint	MS angle frames for Classified AHU TDF for unclassified AHU
Bonding/sealant	Silicone based sealant
INSULATION:	
Make	THERMOBREAK
Type	Cross linked polyolefin foam
Thermal Conductivity 'K' value,	0.032 W/mK @ 23° C
Density Kg / m ³	25
Temperature range	-80 Deg.C to +100 Deg.C
Finishing material	Aluminum foil
Fire performance	Class "0"

Client:
Supplier/ Manufacturer: PHARMA ENGINEERS, HYDERABAD

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DESIGN QUALIFICATION (DQ)

Thickness	19mm For Supply & 13 mm For Return Ducts				
SUPPLY AIR TERMINAL MODULE					
Make	M/s PHARMA ENGINEERS				
Module MOC	GI POWDER COATED				
Grill MOC	SS 304				
Thickness of sheet	1.2 mm				
Damper	In built with housing				
TERMINAL HEPA FILTERS IN ROOM					
Make of Filter	AAF				
Type of filter	Flange type				
Filter Media	Micro Fiber Glass				
Compatibility of water wash	No				
Filter Test method	EN 1822				
Filter classification as per EN 779	H-14				
Average Efficiency at MPPS	99.995%				
Equivalent particle size in terms of market language	0.3 micron-Un authenticated data				
I.P.D of Filter (Approximate)	250 ± 10 Pa				
F.P.D of Filter (Approximate)	500 Pa				
Room Names	HEPA filter sizes (mm)	Hood Size (mm)	Damper Size(mm)	CFM	Qty
COATING 1	580X580x149	610x610x220	300x300	1000	4 No.
SUPPLY AIR TERMINAL FOUR WAY DIFFUSERS					
Make	M/s SYSTEM AIR INDIA PVT LTD M/s PHARMA ENGINEERS				
Type	Ceiling mounted square type horizontal air diffusion pattern				
Damper MOC	Aluminum				
ROOM NAMES	DIFFUSER SIZE (MM)	CFM	QTY		

Client:
Supplier/ Manufacturer: PHARMA ENGINEERS, HYDERABAD

Equipment: HVAC SYSTEM FOR AHU-01

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DESIGN QUALIFICATION (DQ)

SUPPLY AIR TERMINAL GRILLES (Linear Grilles)

Make	M/s SYSTEM AIR INDIA PVT LTD M/s PHARMA ENGINEERS		
Type	Two-way rectangular grill		
Material Of Construction	Extruded Aluminum		
Damper	Opposed blade		
Damper Operation	Face Key operated		
Damper MOC	Al. extruded		
ROOM NAMES	GRILL SIZE (MM)	CFM	QTY

RETURN AIR TERMINAL MODULE

Make	M/s PHARMA ENGINEERS			
Module MOC	GI POWDER COATED			
Grill MOC	SS 304			
Thickness of sheet	1.2 mm			
Damper	In built with housing			
Room Names	Hood Size (mm)	Damper Size(mm)	CFM	Qty
COATING 1	610x610x220	300x300	1000	4 No.

RETURN AIR TERMINAL FOUR WAY DIFFUSERS

Make	M/s SYSTEM AIR INDIA PVT LTD M/s PHARMA ENGINEERS		
Type	Ceiling mounted square type horizontal air diffusion pattern		
Damper MOC	Aluminum		
ROOM NAMES	DIFFUSER SIZE (MM)	CFM	QTY

Client:
Supplier/ Manufacturer: PHARMA ENGINEERS, HYDERABAD

Equipment: HVAC SYSTEM FOR AHU-01

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DESIGN QUALIFICATION (DQ)

RETURN AIR TERMINAL GRILLES (Linear Grilles)

Make	M/s SYSTEM AIR INDIA PVT LTD M/s PHARMA ENGINEERS		
Type	Two-way rectangular grill		
Material of Construction	Extruded Aluminum		
Damper	Opposed blade		
Damper Operation	Face Key operated		
Damper MOC	Al. extruded		
ROOM NAMES	GRILL SIZE (MM)	CFM	QTY

RETURN AIR RAISERS

Make	M/s. Pharma engineers		
Riser MOC	GI Powder Coated		
Damper MOC	Aluminum		
Riser Grill MOC	SS 304		
Riser Filter Make	M/s Pharma Engineers		
Type of filter	Flange / Box		
Filter Media	Synthetic		
Compatibility of water wash	Yes		
Filter Test method	EN-779		
Filter classification as per EN 779	G-4		
Average arrestance of synthetic dust	90 ≤ Am		
Equivalent particle size in terms of market language	10 micron-Un authenticated data		
Room Names	Return air Raiser Size (mm)	Filter Size	Qty

Client:
Supplier/ Manufacturer: PHARMA ENGINEERS, HYDERABAD

Equipment: HVAC SYSTEM FOR AHU-01

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DESIGN QUALIFICATION (DQ)

7. SAFETY FEATURES & INTERLOCKS

Sr.No.	ACTIVITY	ACTION	ALARMS
1.	If Blower Service Door Open's	Blower will be off	No Alarm Provided
2.	Over load of Process Motor	Process, Bed motor and heaters will be OFF	Indication is provided without Alarm
3.	Over load of reactivation Motor	Reactivation, Process, Bed motor and heaters will OFF.	Indication is provided without Alarm
4.	Over load of Bed Motor	Bed and heaters will be OFF	Indication is provided without Alarm
5.	Safety thermostat trip	Heaters will be OFF	Indication is provided without Alarm
6.	Reactivation pressure switch trip	Reactivation, Process, Bed motor and heaters will OFF.	Indication is provided without Alarm
7.	Bed motor limit switch trip	Bed and heaters will be OFF	Indication is provided without Alarm
8.	In case of smoke in the return duct	Smoke sensor shall activate the fire damper Actuators to close at Supply & Return Ducts and blower will be off	Alarm output provided as indication at control panel. (Visual Indication)
9.	In case of smoke in the return duct	Fusible Link melts at 74 deg F and activates the limit switch to close the damper at Return Duct / Supply Duct and blower will be off	Alarm output provided as indication at control panel. (Visual Indication)
10.	Lock out, Tag Out	Provision made with the enclosure	

Client:

Supplier/ Manufacturer: **PHARMA ENGINEERS, HYDERABAD**

Equipment: **HVAC SYSTEM FOR AHU-01**

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DESIGN QUALIFICATION (DQ)

8. UTILITIES REQUIRED

S.NO	DESCRIPTION	CONSUMPTION
1.	Chilled Water GPM @ 7°c	
2.	Hot Water GPM @50°c	
3.	Steam Kg/hr @100°c	
4.	Electricity 3Ø	

9. LIST OF EXCLUSIONS

Client shall execute Following works

- Drain line of AHU
- Insulation of piping & Manifold
- AHU Stand
- Piping from Manifold to Main Header

Client:

Supplier/ Manufacturer: **PHARMA ENGINEERS, HYDERABAD**

Equipment: **HVAC SYSTEM FOR AHU-01**

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DESIGN QUALIFICATION (DQ)

10. ABBREVIATIONS

ACPH	Air Changes Per Hour
AHU	Air Handling Unit
ACD	AHU cum Dehumidifier
BIBO	Bag in Bag Out
CFM	Cubic Feet Per Minute
DQ	Design Qualification
FPI	Fins Per Inch
GA	General Arrangement
GI	Galvanized Iron
GSS	Galvanized Steel Sheet
HVAC	Heating Ventilation and Air Conditioning
KW	Kilowatt
Hz	Hertz's
MM	Milli Meter
MOC	Material of Construction
MS	Mild Steel
NC	Not Controlled
NMT	Not More Than
PP	Pre-Painted
SS	Stainless Steel
RPM	Revolution Per Minute
SWG	Standard Wire Gauge

Client:

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DESIGN QUALIFICATION (DQ)

11. LIST OF DRAWINGS AND DOCUMENTS ENCLOSED

S.NO	DRAWING NAME	ENCLOSED (YES / NO)
1.	ROOM DATA SHEET	
2.	BASIC LAYOUT	
3.	AREA CLASSIFICATION ZONING LAYOUT	
4.	AHU ZONING DRAWING	
5.	PRESSURE DIFFERENTIAL ZONING	
6.	AIR FLOW SCHEMATIC DRAWING	
7.	RCP LAYOUT	
8.	HVAC DUCTING DRAWING	
9.	AHU DRAWING CUM DATA SHEET	
10.	EXHAUST DRAWING CUM DATA SHEET	
11.	DEHUMIDIFIER DRAWING CUM DATA SHEET	
12.	ELECTRICAL PANEL GA DRAWING	
13.	POWER AND CONTROL WIRING DRAWING FOR AHU PANEL	
14.	POWER AND CONTROL WIRING DRAWING FOR INSTRUMENTS	
15.	CHILLED WATER MANIFOLD G.A DRAWING	
16.	HOT WATER MANIFOLD G.A DRAWING	
17.	STEAM WATER MANIFOLD GA DRAWING	
18.	TERMINAL SUPPLY & RETURN AIR MODULE GA DRAWING	
19.	SUPPLY & RETURN AIR DIFFUSER GA DRAWING	
20.	SUPPLY & RETURN AIR GRILL GA DRAWING	
21.	RETURN AIR SRISER GA DRAWING	