राष्ट्रीय कोशिका विज्ञान केंद्र

NATIONAL CENTRE FOR CELL SCIENCE

(An Autonomous Institution of the Department of Biotechnology, Govt. of India)
Savitribai Phule Pune University Campus, Ganeshkhind, Pune- 411007

MINUTES OF PRE-BID MEETING FOR SITC, QUALIFICATION AND VALIDATION OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY ON TURNKEY BASIS AT NCCS JIDNYASA BUILDING, KOTHRUD, PUNE

Tender Ref No. : NCCS/MAINT/GMP/454C/2023-24; dt-01/11/2023.
Date : 10/11/2023 @ 14:30 Hrs
Venue : Board Room 'A' Building.

Clarification of all the queries raised by prospective bidders during pre-bid is as listed below.

S.N.	PARTICULAR	QUERY	CLARIFICATION
A	**DYNA FILTERS PVT. LTD.**		
1	Tech Bid, Sr. No. 3.2.6: Earnest Money Deposit (EMD)	MSME registered Bidders requested for exemption from submission of EMD.	NCCS did not agree for the same as there is no such provision in any guidelines.
2	Price Bid, Sr. No. 1.3.9- CIVIL WORKS-DISMANTLING WORKS Removing of Existing Fans, Lights, Panels, DB's and other Electrical items. All the loose items to be handed over to NCCS and area to be fully cleaned.	Bidder requested to mentioned quantity instead of lumpsum for quoting.	NCCS did not agree for the same as all mentioned items are considered in lump sum and suggested the bidders to visit the site for proper understanding scope of work.
3	Price Bid, Sr. No. 1.8.1- CIVIL WORKS-SLAB STRENGTHING WORKS BASIC REPAIR : Anti-corrosion treatment for affected reinforcing bars, application of polymer modified mortar, Nozzle fixing and Grouting etc.	Bidder requested to mentioned quantity instead of lump sum for quoting.	NCCS did not agree for the same as all mentioned items are considered in lump sum and suggested the bidder to visit the site for proper understanding scope of work.
4	Price Bid, Part- II A & B (CAMC & AMC)	Bidder requested suggest how to quote for CAMC and AMC.	NCCS informed the bidder that the CAMC and AMC scope of work is already mentioned in the price bid and suggested to quote accordingly.
B	**TRANSTECH HVAC, PUNE**		
1	Tech Bid, Sr. No. 3.1: IMPORTANT DATES OF TENDERING PROCESS	Bidder asked whether technical and commercial bid has to be submitted on 21st because commercial opening date notmentioned.	NCCS clarified that bidder should submit both technical and commercial bid on same scheduled date and time.
2	Price Bid- File	Bidder requested for excel file of the BOQ.	NCCS did not agree for the same. Excel file is not required because the bidder shall quote on variation in percentage for the value proposed in tender.
3	Tech Bid, Sr. No. 3.4 (e): Technical Compliance Table & technical data sheet in tabular form comparing each specification of the quoted items with detail drawings /layouts with that given in tender document.	Bidder asked for elaboration.	NCCS informed that bidder should submit technical data sheet for quoted items.
4	Tech Bid, Sr. No. 3.4 (f): Technical Specifications with brands / makes offered by bidder.	Bidder asked do we have to give what we have quoted or as per approved make.We will be quoting as per approved make.	NCCS informed that bidder should quote considering approved makes / brands only.

S.N.	PARTICULAR	QUERY	CLARIFICATION
5	Tech Bid, Sr. No. 3.1: IMPORTANT DATES OF TENDERING PROCESS- Due date for submission of Tender 21/11/2023 @15 Hrs	Bidder requested for extension for submission of tender till 05/12/2023 due to Diwali holidays.	NCCS agreed for the same and extended the date upto 24/11/2023 @ 15 Hrs.
6	Tech Bid, Sr. No. 6.6: PERFORMANCE BANK GUARANTEE (PBG)- The Successful Bidder shall submit an irrevocable Performance Bank Guarantee of 5% (Five percent) of the contract amount for his proper performance of the contract agreement,	Bidder requested that can they submit normal PBG valid for 1 year and not irrevocable.	NCCS did not agree for the same; however NCCS informed that bidder can submit PBG for one year.
7	Tech Bid, Sr. No. 6.9: PAYMENT TO CONTRACTOR Payment in maximum three RA bills, subject to each RA bill raised shall not exceed 25% each as per actual work carried out at site and such RA bills amount will be certified for payment. Final bill amount will be certified for payment after completion of tendered work in all respect including testing, commissioning, documentation and validation. 10% Security Deposit will be deducted from each bill payable to the contractor.	Bidder request to have no limit for the RA bills, we shall give RA bills per month 2 nos as the project goes forward, since we have to pay to our manufacturers/supplier and For smooth cash flow of the project.	NCCS did not agree for the same.
8	Tech Bid, Sr. No. 6.9: PAYMENT TO CONTRACTOR	Bidder request to release 80% amount against Supply of material at site. 10% against installation, 10% against completion of work against commissioning.	NCCS did not agree for the same& asked the bidder to follow the tender payment terms.
9	Tech Bid, Sr. No. 6.15: DATE OF COMPLETION: The entire work shall be completed within six month (180 days) in all respects including validation.	Bidder requested that there is no change in drawing, layout etc. We request for 8 to 10 months project completion.	NCCS informed that there is no change in drawings / layouts. It also informed that the entire work shall be completed within six month (180 days) in all respects including validation.
10	Tech Bid, Point No. 8.0- SCOPE OF WORK & TECHNICALDETAILS: Contractor shall prepare project planning upto level2 on MS Project / Primavera& submit it to NCCS/Consultant	Bidder requested can they give in excel format.	NCCS did not agree for the same.
11	Tech Bid, Point No. 5.0, Pg. No.297- TECHNICAL SPECIFICATION: AHU- Filters	Bidder requested to provide detail for Filters as it is not visible properly	NCCS agreed to upload the same along with the MOM of pre-bid meeting.

S.N.	PARTICULAR	QUERY	CLARIFICATION
12	Tech Bid, Point No. 5.0, TECHNICAL SPECIFICATION AHU AND VRF SYSTEM	We request to kindly tell us the HVAC scheme of 3 pipe VRF system for AHU whether used for any other site for reference and in running stage and of which OEM make. Can we get guarantee for the system from OEM for 5 years also. We request to give overall PID diagram of AHU and VRF system to us.	Bidders query was clarified & the concept of proposed 3 pipe VRF system was explained. The concept schematic drawing & VRF PID shall be uploaded along with the MOM of pre-bid meeting. For system guarantee, bidder shall contact respective OEM. Bidder shall discuss with VRF OEM to understand the proposed system & then quote accordingly. NCCS agreed to upload the same along with the MOM of pre-bid meeting.
		Whether Derating to be considered or not. Since temperature of 35 to 38 ambient mentioned in tender.	Bidder to quote as per the capacity mentioned in the tender.
		Regarding the VRF ODU units we require modbus protocol, so that VRF readings can be read on the DDC controller. This item not in BOQ.	BACNET IP controller considered in BOQ line item no 4.5 in VRF BOQ shall be used for connection.
		Whether 2 to 3 AHU's system can be linked with common header of VRF ODU system or can we take separate ODU for each AHU system.	NCCS did not agree for the same. Bidder shall follow the PID attached.
		GFC drawing needed for all, AutoCAD format after award of work.	NCCS agreed for the same. NCCS shall provide all soft copies of the TENDER SINGLE LINE GFC DRAWINGS. Based on these drawings successful bidder shall prepare shop drawings for all turnkey tender works. These shop drawings shall be reviewed & approved by NCCS / Consultant for execution GFC drawings.
		VRV standby is not present.	NCCS informed that, considering the space constraint, standby provision is not considered.
13	Price bid: Bidder to do design and strengthening as per the relevant IS codes IS : 1893/2016 and ailed codes for the structure to withstand 450kg/sqm live load. As per COEP Pune report.	Bidder requested that certificate from COEP is required?	NCCS informed that structural drawings for Lift Shaft, MS Shed, MS Staircase and Strengthening workshould be vetted through COEP, Pune before start of the work and after completion of work, submission of reports etc. at the quoted rates. NCCS will not pay any charges for the same.
14	Price Bid: Excavation for Footing strengthening and refixing the same is part of scope as per the BOQ	Bidder asked wheather the item for same is present in BOQ.	Yes, it is part of tender BOQ. (Refer line item no 33 in the civil works related to building strengthening)

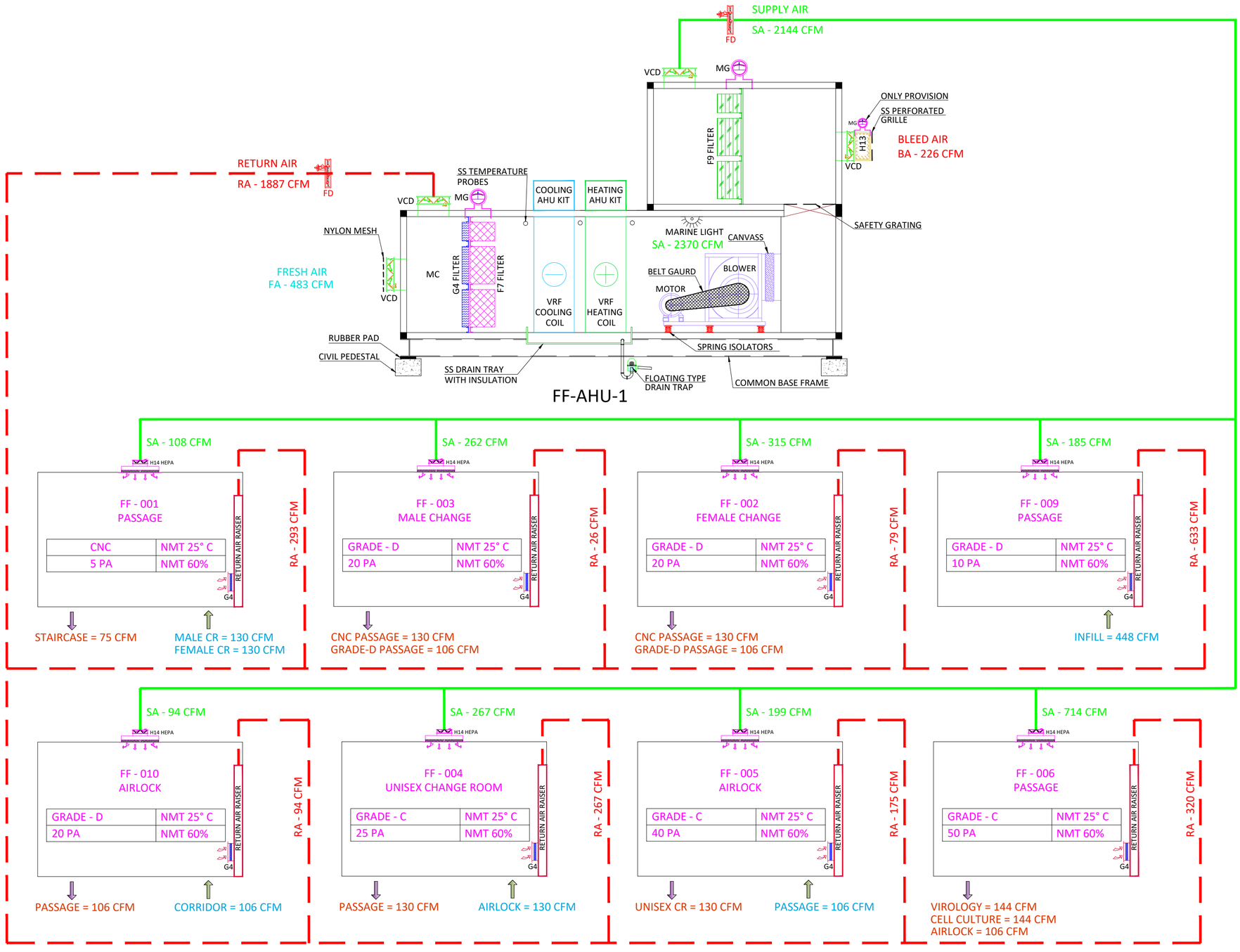
S.N.	PARTICULAR	QUERY	CLARIFICATION
15	Price Bid, Item No. 19: Supplying and drawing, testing and commissioning of following sizes of 1100V grade FRLS PVC insulated copper conductor, multi strand single core cable in the existing surface / recessed steel / PVC conduit, as required, as per tender technical specification 3 x 2.5 Sq.mm	Bidder asked that this rate as very less as compared to today's cable rate and asked clarification as this is supply & installation.	NCCS informed that the BOQ items are based on CPWD DSR, PWD MSR and market rates for non-DSR items. Bidder has choice to quote in percentage either above or below only.
16	Price Bid, Item No. 19: THERMAL INSULATION- Elastomeric Nitrile Rubber foamed Self-adhesive	Bidders asked NCCS can they use adhesive mentioned in the BOQ.	NCCS informed that bidder shall not deviate from specifications mentioned in the tender. Bidder shall consider item/ materials / makes as mentioned in the tender BOQ only.
17	Price Bid, Item No. 7: Terminal HEPA filter (H-14 as per EN1882 Class) with Protective Expanded Metal Screen.	Bidders asked NCCS can they consider Protective Expanded Metal Screen?	The Protective screen is a part of the HEPA filters proposed, bidder shall follow the specification & BOQ as mentioned in the tender.
18	Price Bid, Item No. 11: PROPELLER EXHAUST FAN- Wall mounting propeller exhaust fan made of Mild Steel with polymer coating, Suitable for wall mounted outdoor application.	Bidder asked NCCS regarding brands.	NCCS informed to consider approved brands of items/ materials as mentioned in the tender document only.
19	Price Bid, Item No. 13: COMMISSIONING & VALIDATION AT REST & IN OPERATION OF HVAC SYSTEM	Bidder asked can they do validation at rest and in operation is in NCCS scope.	NCCS informed that validation at rest and in operation is in the scope of contractor. After submission of both reports, final bill will be released.
20	Price Bid, Item No. 13: COMMISSIONING & VALIDATION AT REST & IN OPERATION OF HVAC SYSTEM- Room Temperature & Humidity mapping and monitoring for 3 days	Please give number of sensor points for mapping for each room for proper calculation.	Minimum 2 numbers per room (small change rooms), for other rooms, the number of data logger shall be square root of the area + 1 number.All data loggers shall be placed at working level.For more details refer ISO 14644 (1-4)
		Please give Air flow diagram of each	Airflow diagram for all AHU's is a part of tender and will be uploaded along with the MOM of pre-bid meeting.
		Request to kindly elaborate the VRF scheme, how are we going to control the common ODU, common header of ref piping connected to different AHUs systems. Also how the VRF system is going to hook up or communicate with the DDC controller.	Refer the tender specification, PID & Schematic representation with working philosophy.AHU kit (Expansion & communication) is considered based on the AHU capacity. This will control the flow of refrigerant based on the requirement.
		Can we have DDC or PLC controller please specify.	Refer line item no 2 of EMS & BMS package.
		Practical challenges while hooking up VRF to DDC controller and then can we see all data on the main server pc. Can controlling be done from main pc for VRF, is any controller extra needed for same. Pls clarify	Discuss with the VRF OEM for the concept of control.

S.N.	PARTICULAR	QUERY	CLARIFICATION
21	Price Bid, Item No. 4.5: Supply, Installation, Testing and Commissioning of BACNET / IP Gateway to integrate with BMS including Ethernet cable to connect to the PC.	Do we have to consider heat recovery module as compared to cooling system.	Yes, heat recovery module is proposed for this tender.
		Return air temp sensor and cooling coil will be operated	Based on temperature sensor in the return air duct, the AHU kit for cooling coil shall operate.
		Across cooling coil we need 2 temp sensor, for precise temp to our control box.	Follow the tender specification
		But for RH control generally we sub cool the temp and then heat how are we going to have this in VRV system.	Refer the tender specification, PID & Schematic representation with working philosophy.
		The control box of DAIKIN cannot communicate with directly with third party then we need to introduce controller for this which is not in BOQ.	Refer OEMS like Samsung / LG. Refer line item no 2 of EMS & BMS package.
		How with common header is controlling going to work in ref piping, can we have different ODU for each AHU. Because the load will be variable.	Refer the tender specification, PID & Schematic representation with working philosophy.AHU kit (Expansion & communication) is considered based on the AHU capacity as this will control the flow of refrigerant based on the requirement.
		Redundancy needed for BMS.	Follow the tender specification
		Pls explain IO summary and control logic for VRV system. And philosophy of operation.	Refer IO summary sheet in the tender document.
		Cooling Coil selection and heating coil selection? How to do. CFM/TR for both cooling coil and heating coil any limitations. Pls elaborate.	Follow the tender specification & drawings
22	Tech Bid, PART 11 (1) – COLD ROOMS	Bidder requested to consider brand of POLFROST for the same.	NCCS did not agree for the same and suggested the bidders to follow the tender makes only.
23	Tech Bid, PART 11 (2) – COMPRESSOR & CONDENSER	Bidder requested to consider brand of EMERSONS for the same.	NCCS did not agree for the same and suggested the bidders to follow the tender makes only
24	Tech Bid, PART 11 (2) – INDOOR EVAPORATOR	Bidder requested to consider brand of POLFROST for the same.	NCCS did notagree for the same and suggested the bidders to follow the tender makes
25	Tech Bid, PART 10 – LAB FURNITURE WORKS - LIST OF APPROVED MAKES - LAB FURNITURE, PASS BOXES, SS CROSS OVER	Bidder requested to consider brand of ICETONAIR, CHEMPHARM, BHAVANI for the same.	NCCS did notagree for the same and suggested the bidders to follow the tender makes
26	Tech Bid, PART 9 – CLEAN ROOM PANEL WORKS	Bidder requested to consider brand of SYNERGY THRISLINGTON, THINKLEAN for the same.	NCCS did not agree for the same and suggested the bidders to follow the tender makes
27	Tech Bid, PART - 2 - ELECTRICAL LT WORKS : CABLE TRAY	Bidder requested to consider brand of SHRUTI INDUSTRIES, AJAY INDUSTRIES for the same.	NCCS did not agree for the same and suggested the bidders to follow the tender makes
28	Tech Bid, PART 3 - HVAC WORKS SUPPLY: AIR / RETURN AIR DIFFUSER & GRILLES (ADP)	Bidder requested to consider brand of AIRPRO, SA INDUSTRIES, CARYAIRE and RUSKIN for the same.	NCCS did not agree for the same and suggested the bidders to follow the tender makes

S.N.	PARTICULAR	QUERY	CLARIFICATION
29	Tech Bid, PART 3 - HVAC WORKS SUPPLY: DUCT FABRICATION	Bidder requested to consider brand of PRIME DUCT, RADICAL for the same.	NCCS did not agree for the same and suggested the bidders to follow the tender makes
C	**DENSOL ENGINEERING PVT LTD**		
1	Tech Bid, Sr. No. 6.9: PAYMENT TO CONTRACTOR	Bidder proposed following payment terms	
	No advance payment will be paid against this work order.	1. No advance	NCCS informed that NCCS being a Government organization cannot pay advances to contractor.
	Payment in maximum three RA bills, subject to each RA bill raised shall not exceed 25% each as per actual work carried out at site and such RA bills amount will be certified for payment. Final bill amount will be certified for payment after completion of tendered work in all respect including testing, commissioning, documentation and validation.	2. Maximum of 9 running bills and 1 final bill. 3. No upper or lower limit on bill value or number of bills per month, as the nature of billing will vary within 6 months. Since high-value items will be coming at the later part of the project, we may have to raise a relatively low-value invoice at the project start.	NCCS confirmed that the other proposed payments terms are not acceptable to NCCS.
		4. Payment is to be made within 15 days of invoice submission as there are no advances.	
	10% Security Deposit will be deducted from each bill payable to the contractor.	5. 5% PBG valid for contract period ie 6 months + 2 months.	NCCS did not agree for the same.
		6. 5% retention on each bill instead of 10%.Considering the quantum and diversity of work, it's not feasible to hold 10% for a year.	NCCS did not agree for the same.
2	Tech Bid, Sr. No. 6.11: Performance bank guarantee for AMC / CAMC- Contractor should submit fresh equal CAMC/AMC amount of the irrevocable Performance Bank Guarantee for his proper performance of the contract agreement, (not withstanding and/or without prejudice to any other provisions in the contract) within period of seven days from the date of issue of work order. The Performance Bank Guarantee shall be valid for the entire CAMC/AMC period of contract plus sixty days. The original PBG will be returned to the contractor from the date of completion of CAMC/AMC period plus sixty days on written request by contractor, without any interest.	Bidder requested to consider PBG of 20% on the value of every year, valid for 1 year. We will give an extension letter or a revised PBG after the completion of every year. Giving a PBG for 5 years at a shot is not feasible from our bankers.	NCCS clarified that Contractor should submit fresh equal CAMC/AMC amount of the irrevocable PBG yearly basis for his proper performance of the contract agreement, (not withstanding and/or without prejudice to any other provisions in the contract) within period of seven days from the date of issue of work order. The PBG shall be valid for the entire CAMC/AMC period of contract plus sixty days. The original PBG will be returned to the contractor from the date of completion of CAMC/AMC period plus sixty days on written request by contractor, without any interest.
3	Price Bid, Part II- Payment terms for AMC / CAMC	Bidder requested to consider a. 20 % advance for each year at the start of the year without ABG. a. Balance payment terms shall be released on agreeable milestones, paid within 15 days after the bill acceptance.	NCCS did not agree for the same.

S.N.	PARTICULAR	QUERY	CLARIFICATION
4	Tech Bid, Sr. No.3.2.2- Pre-qualification Criteria of Experience- The bidder should have satisfactory completed similar type of works for setting up of BSL-1/2 functional laboratories/facilities for Biologicals within last five years (upto last day of submission of tender). Similar type of works means complete turnkey project execution including but not limited to project management, designing, supplying, installing, commissioning, testing and validating Grade B, Grade C and Grade D Cleanrooms, allied utilities, and integration of all relevant services in a turnkey manner as per cGMP standards of Schedule M/ FDA-US/ EMA-EU/ WHO for BSL-2 biologicals laboratories / facilities. The lab should have been made fully functional.	Bidder requested if they can submit copy of work order/ agreement / completion certificate showing GLP.	NCCS did not agree for the same.
5	Tech Bid, Sr. No. 3.2.6: Earnest Money Deposit (EMD)	MSME registered Bidders requested for exemption from submission of EMD.	NCCS did not agree for the same as there is no such provision in the guidelines.
6	Tech Bid, Sr. No.7.30. WARRANTIES AND GUARANTEES- The following Warranty will form part of the contract placed on the successful Bidder: - a) Except as otherwise provided, the Contractor hereby declares that the services, stores articles sold / supplied to NCCS. under this contract shall be of the best quality and workmanship and new in all respects and shall be strictly in accordance with the specification and particulars contained/mentioned in contract. The Contractor hereby ensures Guarantee that the said service/goods would continue to conform to the description and quality aforesaid for a period of 12 months from the date of handing over of the said services/goods to the NCCS., if during the aforesaid period of 12 months the said services/stores be discovered not to conform to the description and quality aforesaid not giving satisfactory performance or have deteriorated, and the decision of the NCCS. in that behalf, shall be final and binding on the CONTRACTOR and the NCCS. shall be entitled to call upon the CONTRACTOR to rectify the services/stores or such portion	Bidder requested to elaborate warranty conditions if equipment repaired /replaced within warranty period or period will be extend for further one year after date of repair/ replacement?	The Guarantee period shall start from the day of handing over to 12 months thereafter.

	thereof as is found to be defective by the NCCS. within 12 months, or such specified period as may be allowed by the NCCS. in his discretion on application made thereof by the CONTRACTOR, and in such an event, the above period shall apply to the services/stores rectified from the date of rectification mentioned in warranty thereof, otherwise the Contractor shall pay to the NCCS. such compensation as may arise by reason of the breach of the warranty therein contained.		
7	Tech Bid, Sr. No. 6.9. PAYMENT TO CONTRACTOR: 10% Security Deposit will be deducted from each bill payable to the contractor.	Bidder requested to consider 5% SD instead of 10%.	NCCS not agreed for the same.
8	Tech Bid, Sr. No. 7.29. TESTING OF MATERIALS- All the required tests as per Technical Specification should be conducted at the cost of the contractor, unless specifically mentioned otherwise. All materials which are to be tested at the manufacturer's works shall satisfactorily pass the tests in the presence of the authorized representative of NCCS / Consultant before being used in the work. In case all requisite testing facilities are not available at the manufacturer's premises, such testing shall be conducted at the approved laboratory. The charges for such testing shall be borne by the contractor.	Bidder requested to elaborate testing of materials	Bidder shall submit relevant test certificates for all items where ever required. The Client or the Client Representative shall visit the Factory for inspection on prior notice at their own cost and no cost for testing has to be considered separately.
D	**JOSHI CONSULTANT PVT LTD**		
1	Tech Bid, Sr. No.3.2.2- Pre-qualification Criteria of Experience- The experience of completed works shall be in the name of Bidder Company. Experience of completed works in Subsidiary/Group Company, Joint Venture Company or as sub-contractor shall not be considered and accepted.	Bidder requested to consider and allow JV for this project.	NCCS not agreed for the same.
E	**Due date for submission of Tender 21/11/2023 @15 Hrs**	**Clarification by NCCS**	**NCCS extended date for submission of Tender upto 24/11/2023 @ 15 Hrs.**

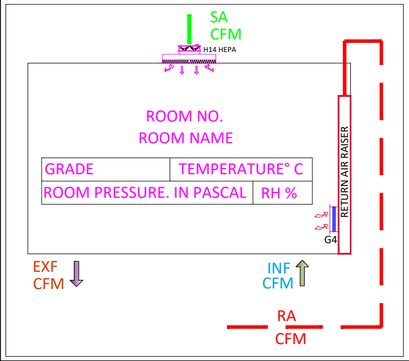


LEGEND

	VOLUME CONTROL DAMPER
	RETURN AIR RAISER WITH PRE FILTER
	VRF COOLING COIL
	VRF HEATING COIL
FD	FIRE DAMPER
H14 HEPA	SUPPLY AIR HEPA MODULE WITH OBD (WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822)
MG	MAGNEHELIC GAUGE
	SUPPLY AIR DUCT
	RETURN AIR DUCT
G4	PRE FILTER WITH AVERAGE ARRESTANCE NOT LESS THAN 90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 3 TO 10 MICRON
F7	FINE FILTER WITH AVERAGE ARRESTANCE OF 80-90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 1 TO 3 MICRON
F9	FINE FILTER WITH NOT LESS THAN 95% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 0.3 TO 1 MICRON
H14	(WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822) OF PARTICLE SIZE 0.3 MICRON

UNIT NO.	FF-AHU-1
CLASSIFICATION	GRADE 'C'
UNIT BLOWER CFM	2370 CFM
COOLING COIL (TR)	8.0 TR
HEATING COIL (KW)	13.0 KW
TEMPERATURE (°C)	NMT 25° C
RELATIVE HUMIDITY (%)	NMT 60%

NOTE :-
THE UNIT SHOWN IN THE AIRFLOW DIAGRAM IS ONLY PICTORIAL REPRESENTATION AND AT ACTUAL IT WILL BE AS PER THE APPROVED G A DRAWING.



REVISIONS :

NO	DESCRIPTION	DATE	BY

TECHNICAL CONSULTANTS:

MJA PHARMATECH PVT. LTD.,
#45, 1st Floor, 5th Cross, 8th Main Road,
Vasanthanagar, Bangalore - 560 052.
Tel: +91-80-2220 4636/222 84583 /41131518

LEAD CONSULTANT:

M/s. SHRIYATA LIFETECH PVT LTD.,
B-1702, BRIGADE GATEWAY, 26/1, DR. RAJKUMAR ROAD,
MALLESWARAM WEST, BANGALORE.

CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University Campus, PUNE.

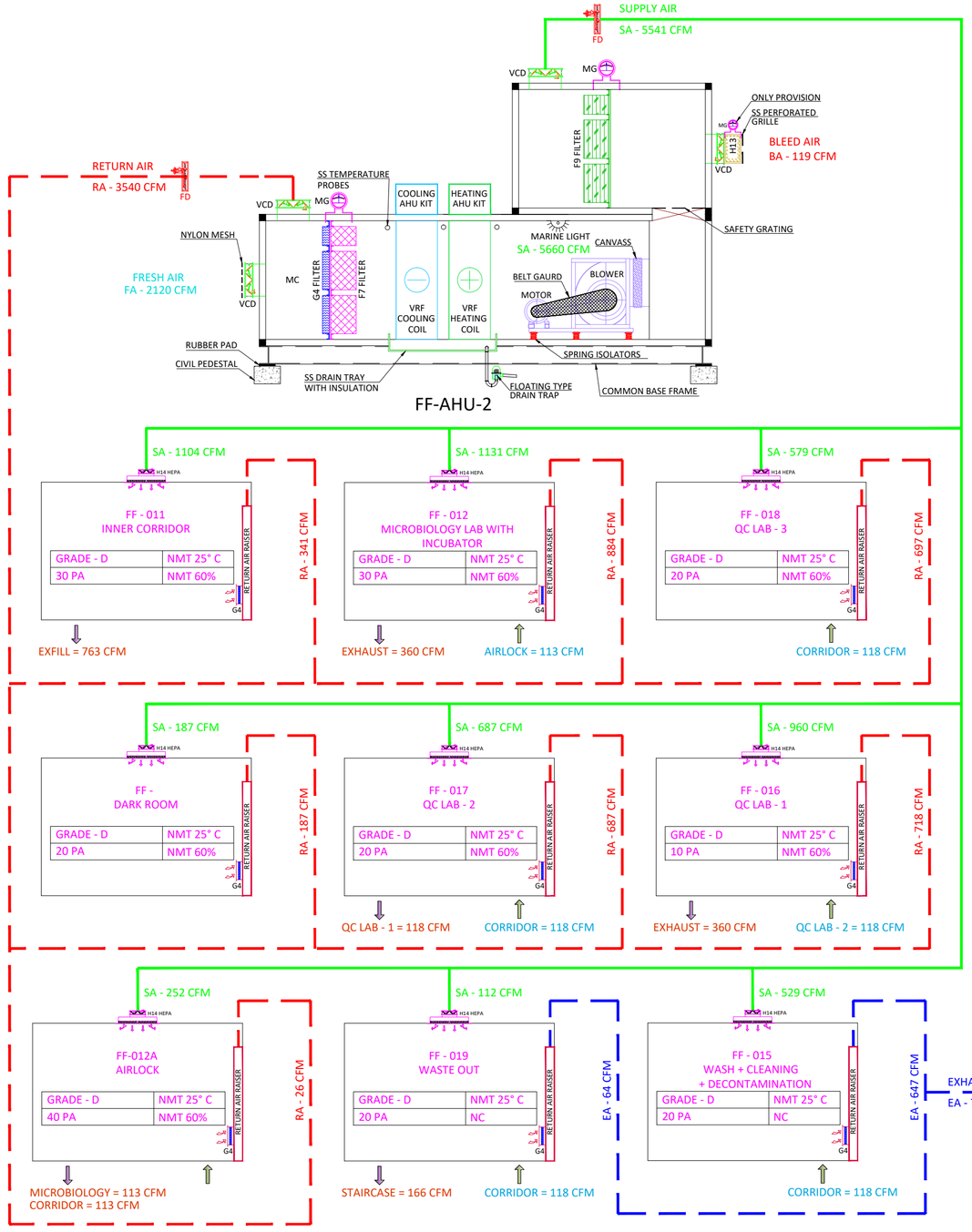
PROJECT :

ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

DRAWING TITLE:

AIRFLOW DIAGRAM FOR FF-AHU-1

DATE	07.08.2023	
DRAWN	KM	
CHECKED	ARS	REVISION
APPROVED	DBS	
SCALE	NTS	PAGE - A3
DRAWING NO.	MJ 437 - HVAC - DR - 2635	



LEGEND

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VRF COOLING COIL	VRF COOLING COIL
VRF HEATING COIL	VRF HEATING COIL
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F9	FINE FILTER WITH NOT LESS THAN 95% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 0.3 TO 1 MICRON
H14	(WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822) OF PARTICLE SIZE 0.3 MICRON

UNIT NO.	FF-AHU-2 / FF-EAU-1
CLASSIFICATION	GRADE 'D'
UNIT BLOWER CFM	5660 CFM / 711 CFM
COOLING COIL (TR)	25.0 TR
HEATING COIL (KW)	28.0 KW
TEMPERATURE (°C)	NMT 25° C
RELATIVE HUMIDITY (%)	NMT 60%

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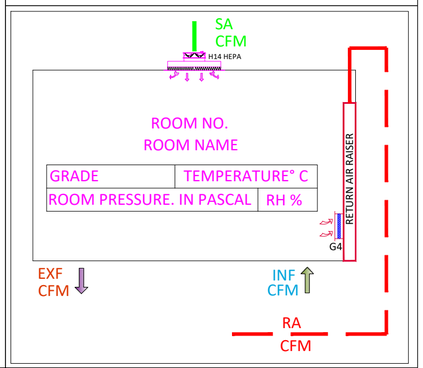

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CLIENT:

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Savitribai Phule Pune University
Campus, PUNE.

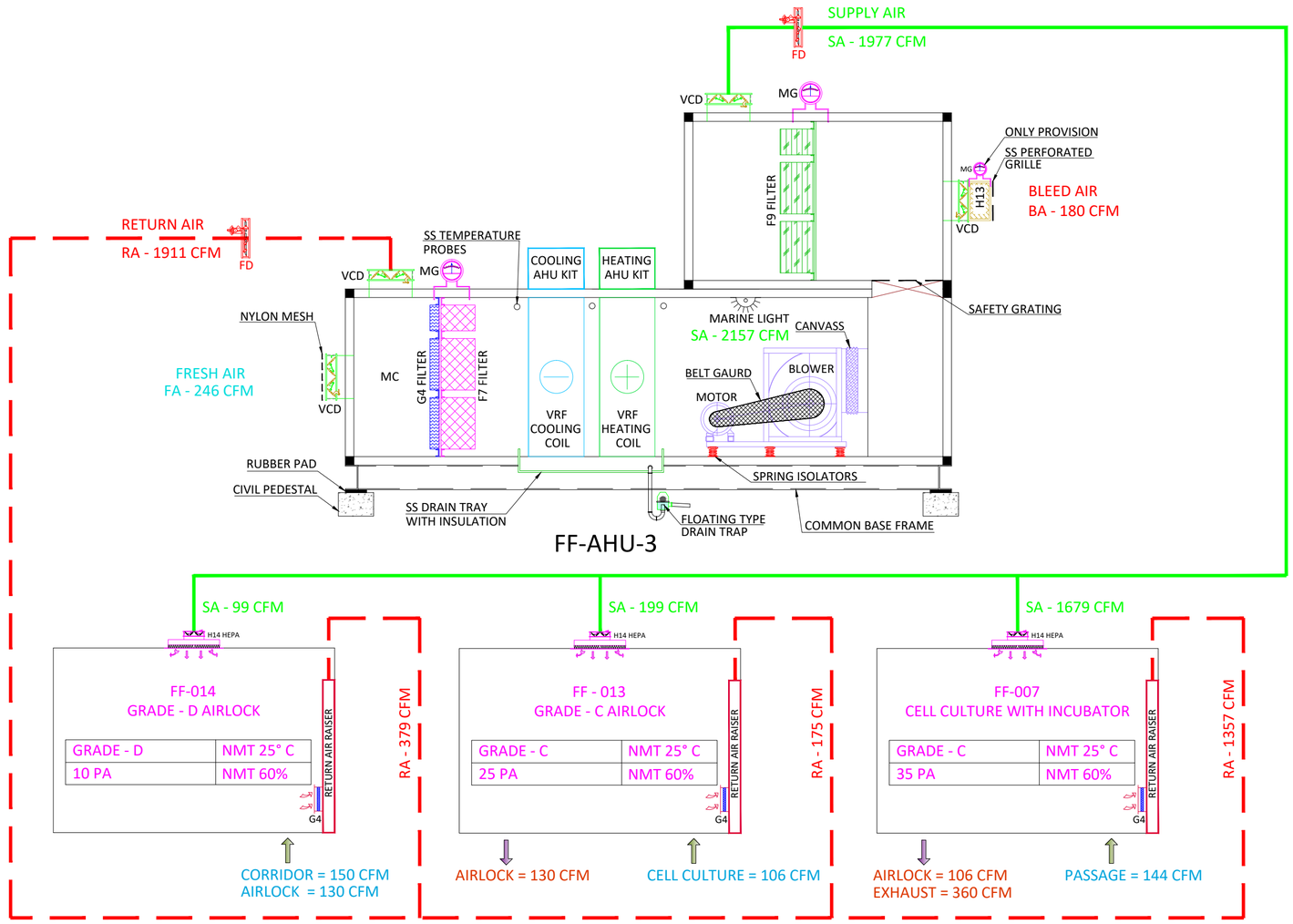
PROJECT :

ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

DRAWING TITLE:

AIRFLOW DIAGRAM FOR FF-AHU-2 & FF-EAU-1

DATE	07.08.2023	
DRAWN	KM	
CHECKED	ARS	REVISION
APPROVED	DBS	
SCALE	NTS	PAGE - A3
DRAWING NO.	MJ 437 - HVAC - DR - 2636	



LEGEND

	VOLUME CONTROL DAMPER
	RETURN AIR RAISER WITH PRE FILTER
	VRF COOLING COIL
	VRF HEATING COIL
FD	FIRE DAMPER
H14 HEPA	SUPPLY AIR HEPA MODULE WITH OBD (WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822)
MG	MAGNEHELIC GAUGE
	SUPPLY AIR DUCT
	RETURN AIR DUCT
G4	PRE FILTER WITH AVERAGE ARRESTANCE NOT LESS THAN 90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 3 TO 10 MICRON
F7	FINE FILTER WITH AVERAGE ARRESTANCE OF 80-90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 1 TO 3 MICRON
F9	FINE FILTER WITH NOT LESS THAN 95% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 0.3 TO 1 MICRON
H14	(WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822) OF PARTICLE SIZE 0.3 MICRON

UNIT NO.	FF-AHU-3
CLASSIFICATION	GRADE 'C'
UNIT BLOWER CFM	2157 CFM
COOLING COIL (TR)	7.0 TR
HEATING COIL (KW)	11.0 KW
TEMPERATURE (°C)	NMT 25° C
RELATIVE HUMIDITY (%)	NMT 60%

NOTE :-
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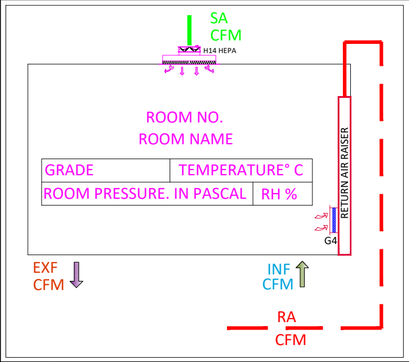


REVISIONS :

NO	DESCRIPTION	DATE	BY

TECHNICAL CONSULTANTS:

MJA PHARMATECH PVT. LTD.,
#45, 1st Floor, 5th Cross, 8th Main Road,
Vasanthanagar, Bangalore - 560 052.
Tel: +91-80-2220 4636/222 84583 /41131518

LEAD CONSULTANT:

M/s. SHRIYATA LIFETECH PVT LTD.,
B-1702, BRIGADE GATEWAY, 26/1, DR. RAJKUMAR ROAD,
MALLESWARAM WEST, BANGALORE.

CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University
Campus, PUNE.

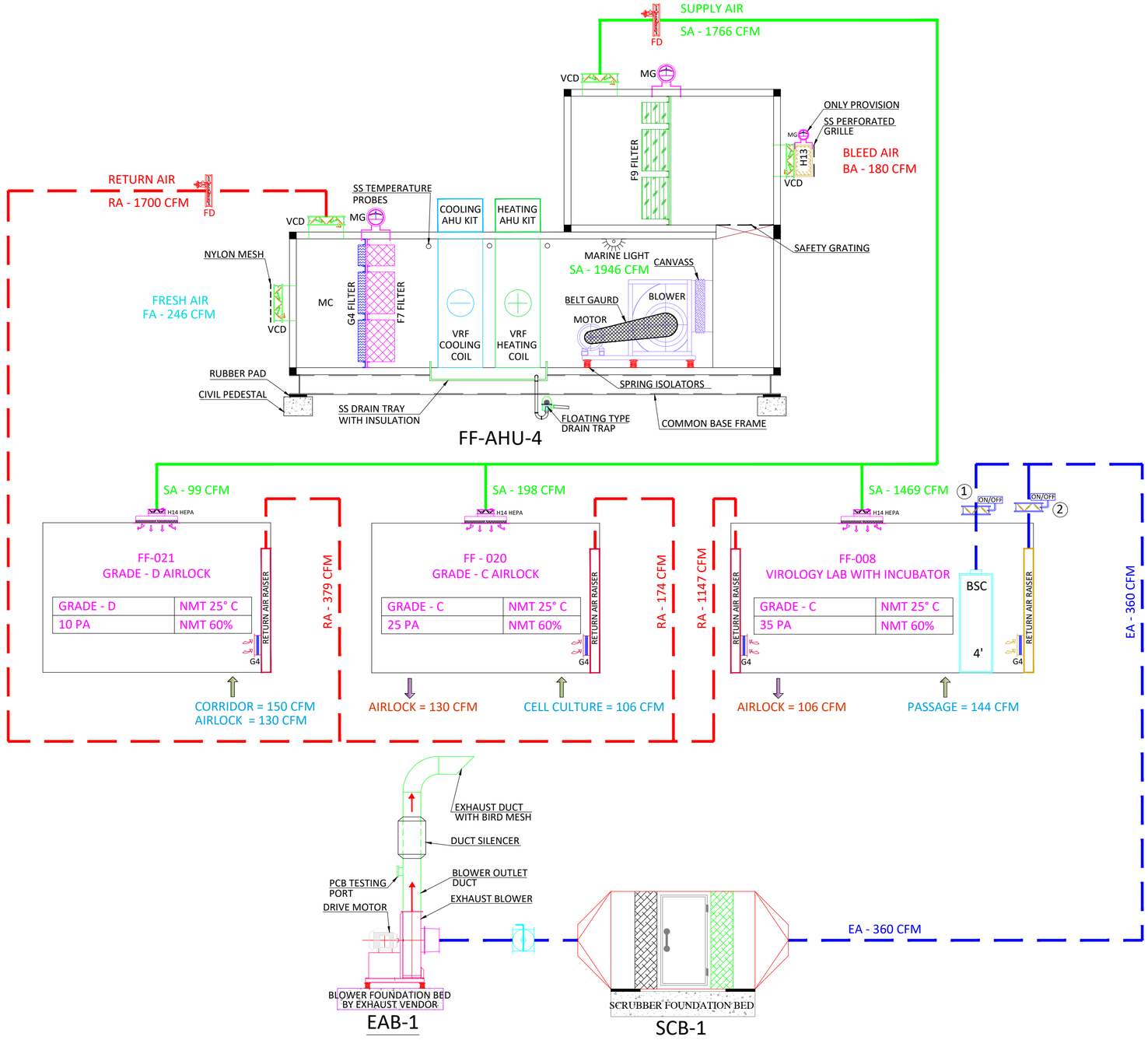
PROJECT :

ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

DRAWING TITLE:

AIRFLOW DIAGRAM FOR FF-AHU-3

DATE	07.08.2023	
DRAWN	KM	
CHECKED	ARS	REVISION
APPROVED	DBS	
SCALE	NTS	PAGE - A3
DRAWING NO.	MJ 437 - HVAC - DR - 2637	



	VOLUME CONTROL DAMPER
	RETURN AIR RAISER WITH PRE FILTER
	VRF COOLING COIL
	VRF HEATING COIL
	FIRE DAMPER
	SUPPLY AIR HEPA MODULE WITH OBD (WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822)
	MAGNEHELIC GAUGE
	ON / OFF DAMPER
	SUPPLY AIR DUCT
	RETURN AIR DUCT
G4	PRE FILTER WITH AVERAGE ARRESTANCE NOT LESS THAN 90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 3 TO 10 MICRON
F7	FINE FILTER WITH AVERAGE ARRESTANCE OF 80-90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 1 TO 3 MICRON
F9	FINE FILTER WITH NOT LESS THAN 95% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 0.3 TO 1 MICRON
H14	(WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822) OF PARTICLE SIZE 0.3 MICRON

UNIT NO.	FF-AHU-4 / SCB-1
CLASSIFICATION	GRADE 'C'
UNIT BLOWER CFM	1946 CFM / 360 CFM
COOLING COIL (TR)	6.0 TR
HEATING COIL (KW)	9.0 KW
TEMPERATURE (°C)	NMT 25° C
RELATIVE HUMIDITY (%)	NMT 60%

NOTE :-
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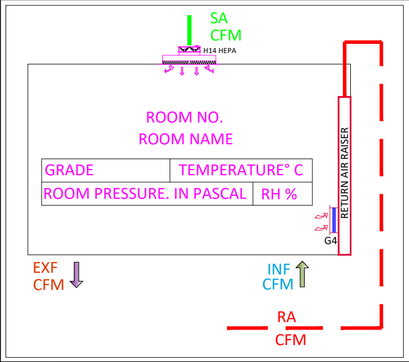

REVISIONS :

NO	DESCRIPTION	DATE	BY

NOTE :-
1) WHEN DAMPER 1 IS OPENED & DAMPER 2 IS CLOSED
2) WHEN DAMPER 2 IS OPENED & DAMPER 1 IS CLOSED

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MALLESWARAM WEST, BANGALORE.

CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University
Campus, PUNE.

PROJECT :

ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

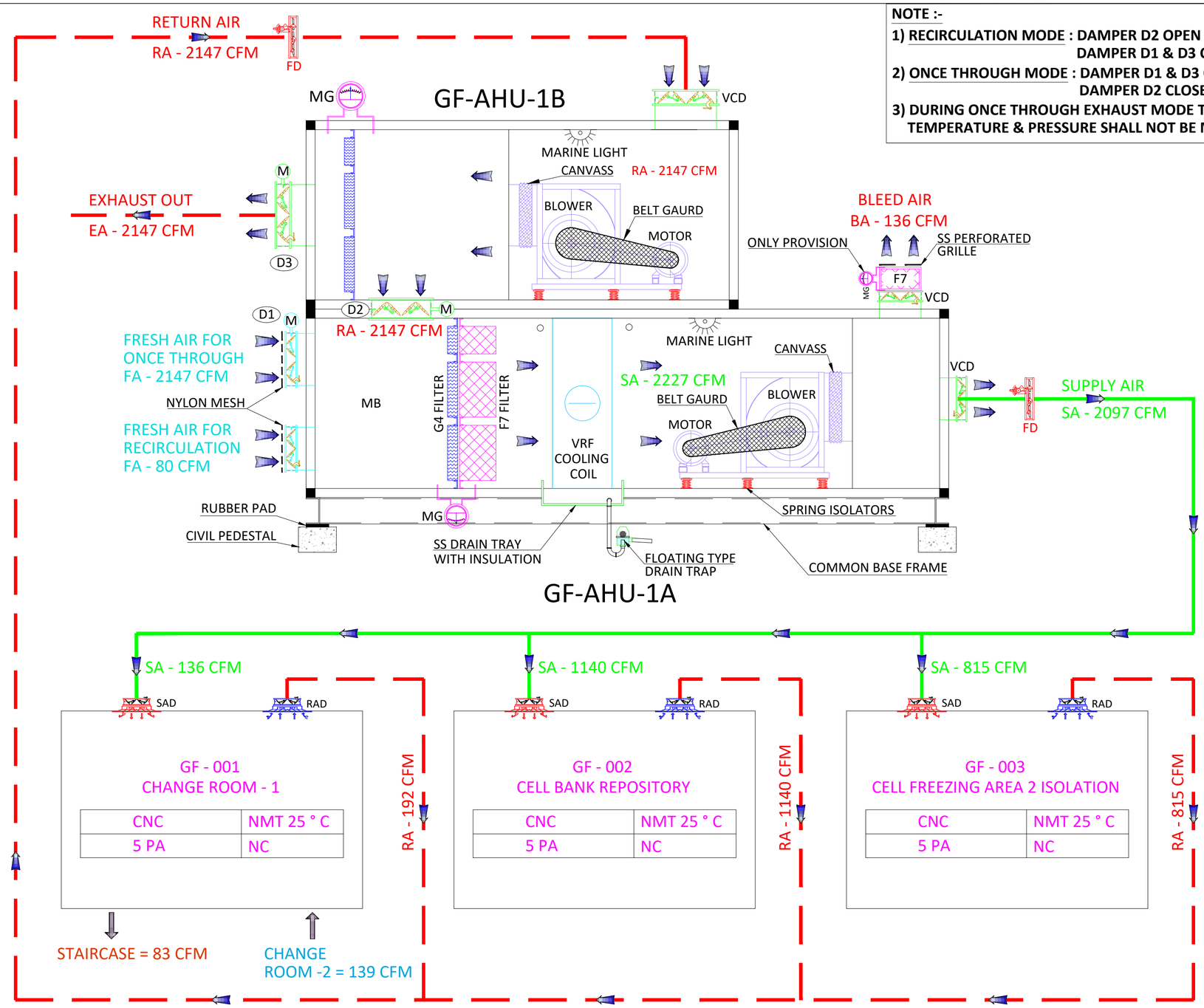
DRAWING TITLE:

AIRFLOW DIAGRAM FOR
FF-AHU-4 & SCB-1, EAB-1

DATE	07.08.2023	
DRAWN	KM	
CHECKED	ARS	REVISION
APPROVED	DBS	
SCALE	NTS	PAGE - A3
DRAWING NO.	MJ 437 - HVAC - DR - 2638	

NOTE :-

1) **RECIRCULATION MODE : DAMPER D2 OPEN**
   DAMPER D1 & D3 CLOSED
2) **ONCE THROUGH MODE : DAMPER D1 & D3 OPENED**
   DAMPER D2 CLOSED
3) **DURING ONCE THROUGH EXHAUST MODE THE ROOM TEMPERATURE & PRESSURE SHALL NOT BE MAINTAINED**

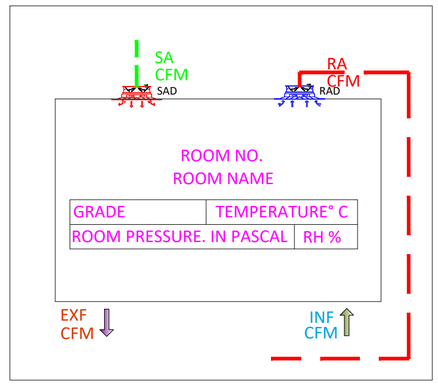


LEGEND

	VOLUME CONTROL DAMPER
M	MOTORIZED DAMPER
WATER COIL	VRF COOLING COIL
FD	FIRE DAMPER
SAD	SUPPLY AIR DIFFUSER (WITH OBD)
RAD	RETURN AIR DIFFUSER (WITH OBD)
MG	MAGNEHELIC GAUGE
	SUPPLY AIR DUCT
	RETURN AIR DUCT
G4	PRE FILTER WITH AVERAGE ARRESTANCE NOT LESS THAN 90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 3 TO 10 MICRON
F7	FINE FILTER WITH AVERAGE ARRESTANCE OF 80-90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 1 TO 3 MICRON

UNIT NO.	GF-AHU-1
CLASSIFICATION	CUC
SUPPLY AIR BLOWER	2227 CFM
RETURN / EXHAUST AIR BLOWER	2147 CFM
COOLING COIL (TR)	8.0 TR
TEMPERATURE (°C)	NMT 25 ° C
RELATIVE HUMIDITY (%)	NC

NOTE :-
THE UNIT SHOWN IN THE AIRFLOW DIAGRAM IS ONLY



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CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University
Campus, PUNE.

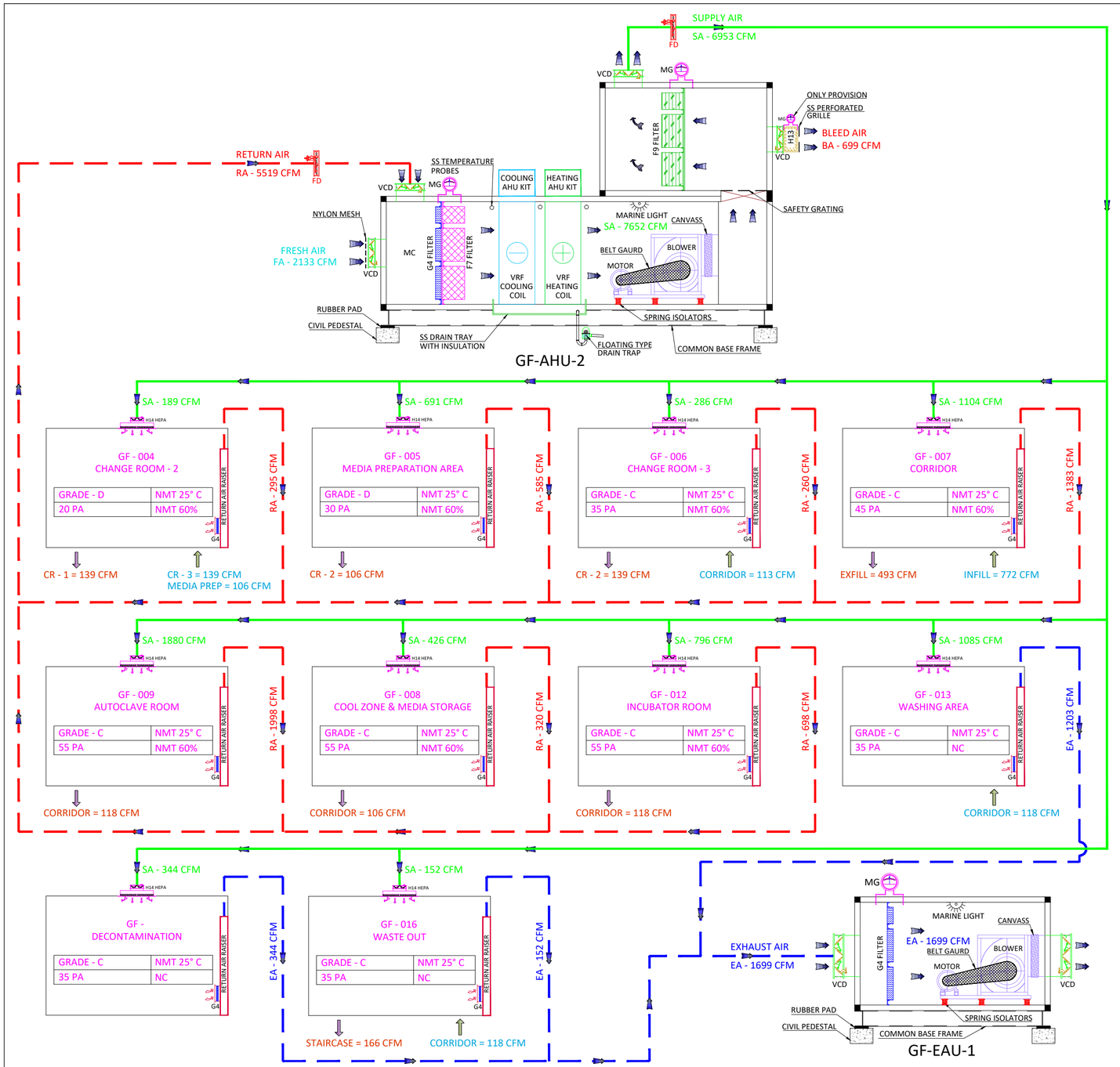
PROJECT :

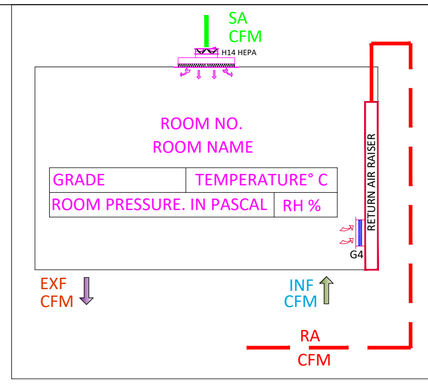
ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

DRAWING TITLE:

AIRFLOW DIAGRAM FOR GF-AHU-1A & GF-AHU-1B

DATE	07.08.2023	
DRAWN	KM	
CHECKED	ARS	REVISION
APPROVED	DBS	
SCALE	NTS	PAGE - A3
DRAWING NO.	MJ 437 - HVAC - DR - 2630	





LEGEND

	VOLUME CONTROL DAMPER
	RETURN AIR RAISER WITH PRE FILTER
	VRF COOLING COIL
	VRF HEATING COIL
	FIRE DAMPER
	SUPPLY AIR HEPA MODULE WITH OBD (WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822)
	MAGNEHELIC GAUGE
	SUPPLY AIR DUCT
	RETURN AIR DUCT
G4	PRE FILTER WITH AVERAGE ARRESTANCE NOT LESS THAN 90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 3 TO 10 MICRON
F7	FINE FILTER WITH AVERAGE ARRESTANCE OF 80-90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 1 TO 3 MICRON
F9	FINE FILTER WITH NOT LESS THAN 95% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 0.3 TO 1 MICRON
H14	(WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822) OF PARTICLE SIZE 0.3 MICRON

UNIT NO.	GF-AHU-2 / GF-EAU-1
CLASSIFICATION	GRADE 'C'
UNIT BLOWER CFM	7652 CFM / 1699 CFM
COOLING COIL (TR)	26.0 TR
HEATING COIL (KW)	29.0 KW
TEMPERATURE (°C)	NMT 25° C
RELATIVE HUMIDITY (%)	NMT 60%

NOTE :-
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REVISIONS :

NO	DESCRIPTION	DATE	BY

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LEAD CONSULTANT:

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MALLESWARAM WEST, BANGALORE.

CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University
Campus, PUNE.

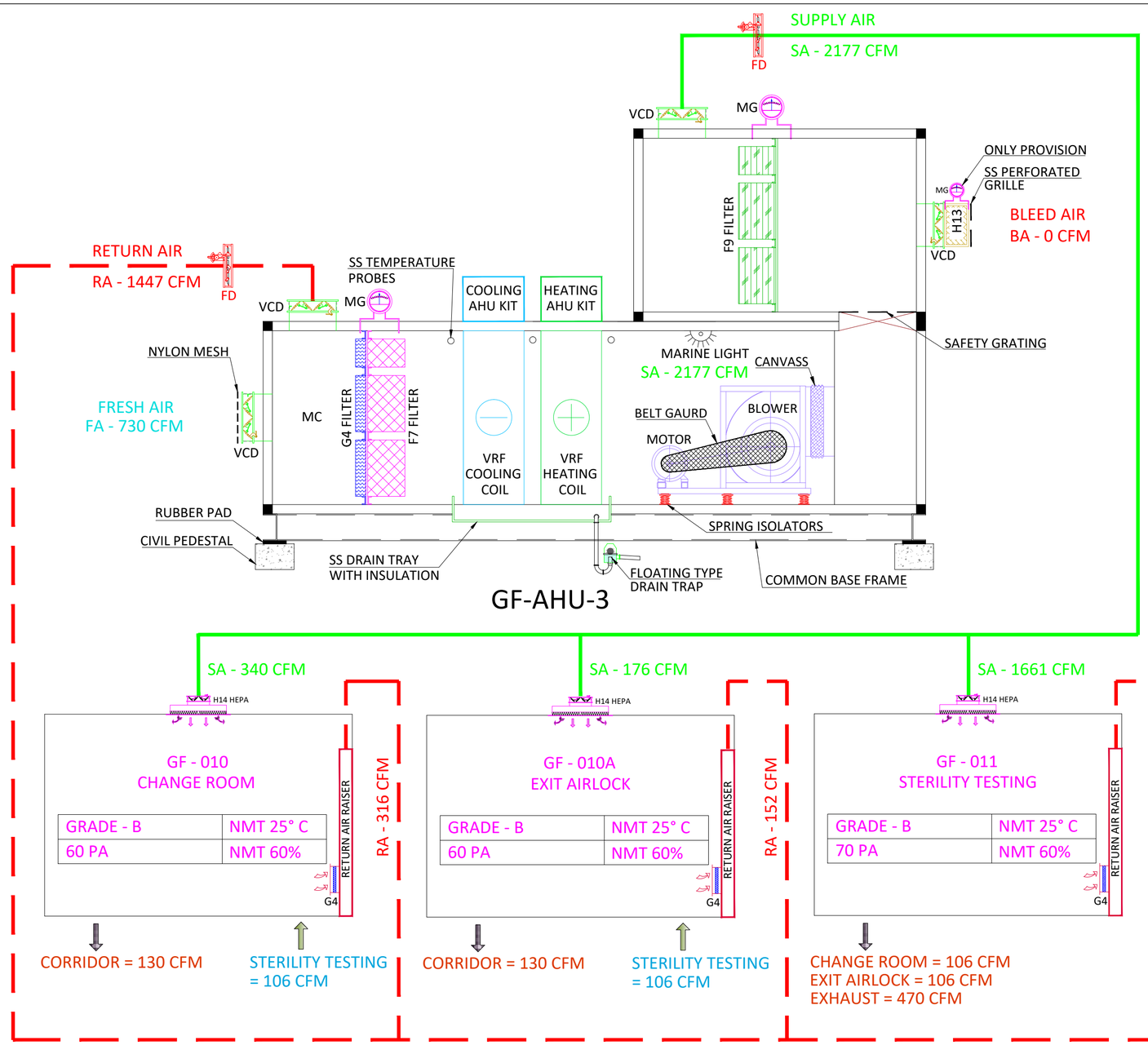
PROJECT :

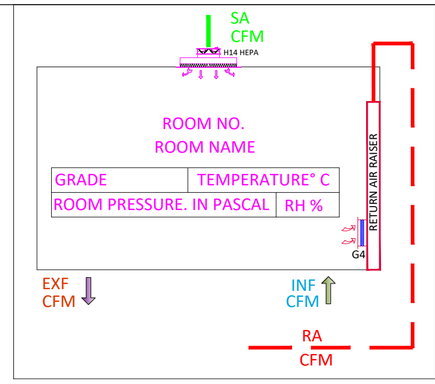
ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

DRAWING TITLE:

AIRFLOW DIAGRAM FOR GF-AHU-2 & GF-EAU-1

DATE	07.08.2023	
DRAWN	KM	
CHECKED	ARS	REVISION
APPROVED	DBS	
SCALE	NTS	PAGE - A3
DRAWING NO.	MJ 437 - HVAC - DR - 2631	





LEGEND

	VOLUME CONTROL DAMPER
	RETURN AIR RAISER WITH PRE FILTER
VRF COIL	VRF COOLING COIL
VRF COIL	VRF HEATING COIL
FD	FIRE DAMPER
H14 HEPA	SUPPLY AIR HEPA MODULE WITH OBD (WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822)
MG	MAGNEHELIC GAUGE
	SUPPLY AIR DUCT
	RETURN AIR DUCT
G4	PRE FILTER WITH AVERAGE ARRESTANCE NOT LESS THAN 90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 3 TO 10 MICRON
F7	FINE FILTER WITH AVERAGE ARRESTANCE OF 80-90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 1 TO 3 MICRON
F9	FINE FILTER WITH NOT LESS THAN 95% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 0.3 TO 1 MICRON
H14	(WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822) OF PARTICLE SIZE 0.3 MICRON

UNIT NO.	GF-AHU-3
CLASSIFICATION	GRADE 'B'
UNIT BLOWER CFM	2177 CFM
COOLING COIL (TR)	9.0 TR
HEATING COIL (KW)	11.0 KW
TEMPERATURE (°C)	NMT 25° C
RELATIVE HUMIDITY (%)	NMT 60%

NOTE :-
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TECHNICAL CONSULTANTS:

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Tel: +91-80-2220 4636/222 84583 /41131518

LEAD CONSULTANT:

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MALLESWARAM WEST, BANGALORE.

CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University
Campus, PUNE.

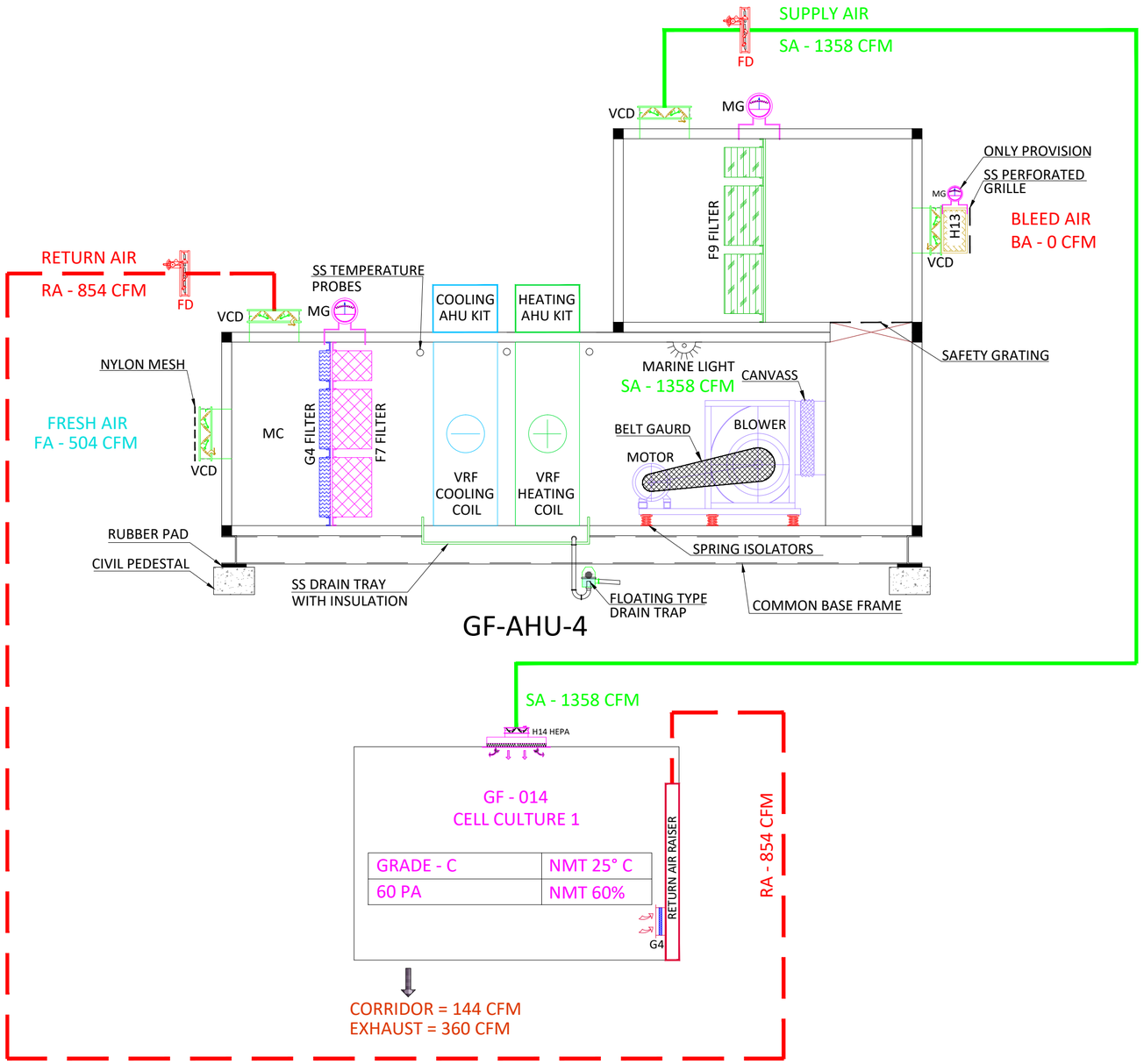
PROJECT :

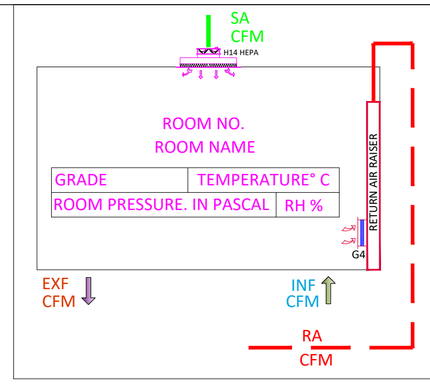
ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

DRAWING TITLE:

AIRFLOW DIAGRAM FOR GF-AHU-3

DATE	07.08.2023	
DRAWN	KM	
CHECKED	ARS	REVISION
APPROVED	DBS	
SCALE	NTS	PAGE - A3
DRAWING NO.	MJ 437 - HVAC - DR - 2632	





LEGEND

	VOLUME CONTROL DAMPER
	RETURN AIR RAISER WITH PRE FILTER
	VRF COOLING COIL
	VRF HEATING COIL
	FIRE DAMPER
	SUPPLY AIR HEPA MODULE WITH OBD (WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822)
	MAGNEHELIC GAUGE
	SUPPLY AIR DUCT
	RETURN AIR DUCT
G4	PRE FILTER WITH AVERAGE ARRESTANCE NOT LESS THAN 90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 3 TO 10 MICRON
F7	FINE FILTER WITH AVERAGE ARRESTANCE OF 80-90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 1 TO 3 MICRON
F9	FINE FILTER WITH NOT LESS THAN 95% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 0.3 TO 1 MICRON
H14	(WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822) OF PARTICLE SIZE 0.3 MICRON

UNIT NO.	GF-AHU-4
CLASSIFICATION	GRADE 'C'
UNIT BLOWER CFM	1358 CFM
COOLING COIL (TR)	7.0 TR
HEATING COIL (KW)	9.0 KW
TEMPERATURE (°C)	NMT 25° C
RELATIVE HUMIDITY (%)	NMT 60%

NOTE :-
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REVISIONS :

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MALLESWARAM WEST, BANGALORE.

CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University Campus, PUNE.

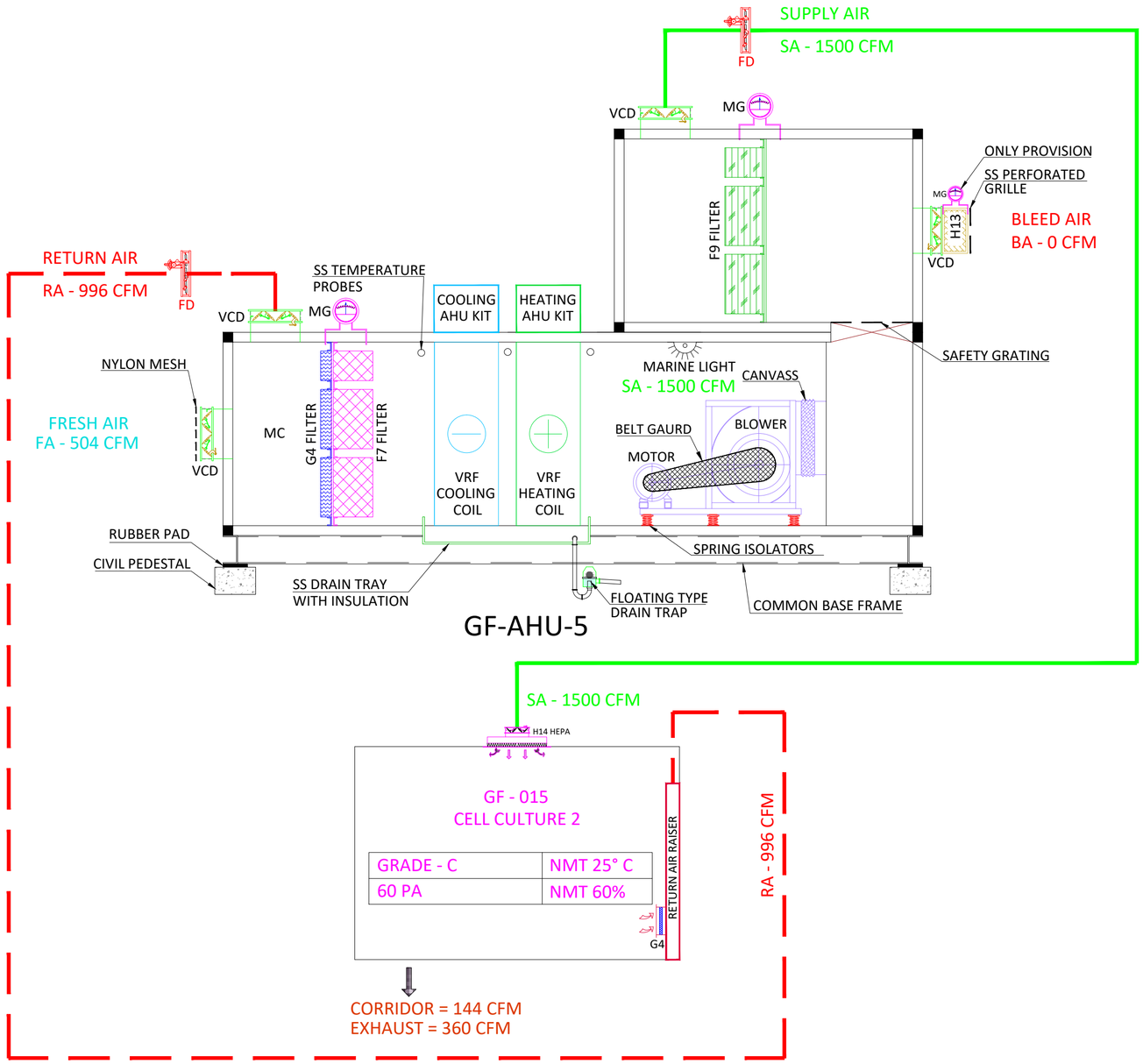
PROJECT :

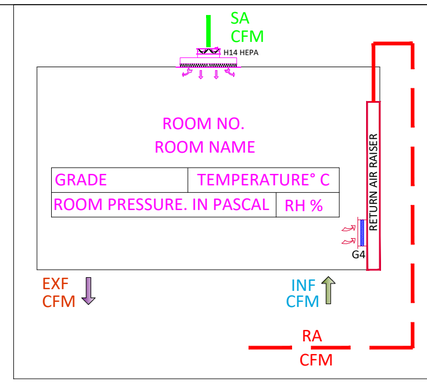
ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

DRAWING TITLE:

AIRFLOW DIAGRAM FOR GF-AHU-4

DATE	07.08.2023	
DRAWN	KM	
CHECKED	ARS	REVISION
APPROVED	DBS	
SCALE	NTS	PAGE - A3
DRAWING NO.	MJ 437 - HVAC - DR - 2633	





LEGEND

	VOLUME CONTROL DAMPER
	RETURN AIR RAISER WITH PRE FILTER
	VRF COOLING COIL
	VRF HEATING COIL
	FIRE DAMPER
	SUPPLY AIR HEPA MODULE WITH OBD (WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822)
	MAGNEHELIC GAUGE
	SUPPLY AIR DUCT
	RETURN AIR DUCT
G4	PRE FILTER WITH AVERAGE ARRESTANCE NOT LESS THAN 90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 3 TO 10 MICRON
F7	FINE FILTER WITH AVERAGE ARRESTANCE OF 80-90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 1 TO 3 MICRON
F9	FINE FILTER WITH NOT LESS THAN 95% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 0.3 TO 1 MICRON
H14	(WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822) OF PARTICLE SIZE 0.3 MICRON

UNIT NO.	GF-AHU-5
CLASSIFICATION	GRADE 'C'
UNIT BLOWER CFM	1500 CFM
COOLING COIL (TR)	8.0 TR
HEATING COIL (KW)	9.0 KW
TEMPERATURE (°C)	NMT 25° C
RELATIVE HUMIDITY (%)	NMT 60%

NOTE :-
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REVISIONS :

NO	DESCRIPTION	DATE	BY

TECHNICAL CONSULTANTS:

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LEAD CONSULTANT:

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MALLESWARAM WEST, BANGALORE.

CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University
Campus, PUNE.

PROJECT :

ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

DRAWING TITLE:

AIRFLOW DIAGRAM FOR GF-AHU-5

DATE	07.08.2023	
DRAWN	KM	
CHECKED	ARS	REVISION
APPROVED	DBS	
SCALE	NTS	PAGE - A3
DRAWING NO.	MJ 437 - HVAC - DR - 2634	

BMS IO SUMMARY LIST

❖ BUILDING MANAGEMENT SYSTEM:

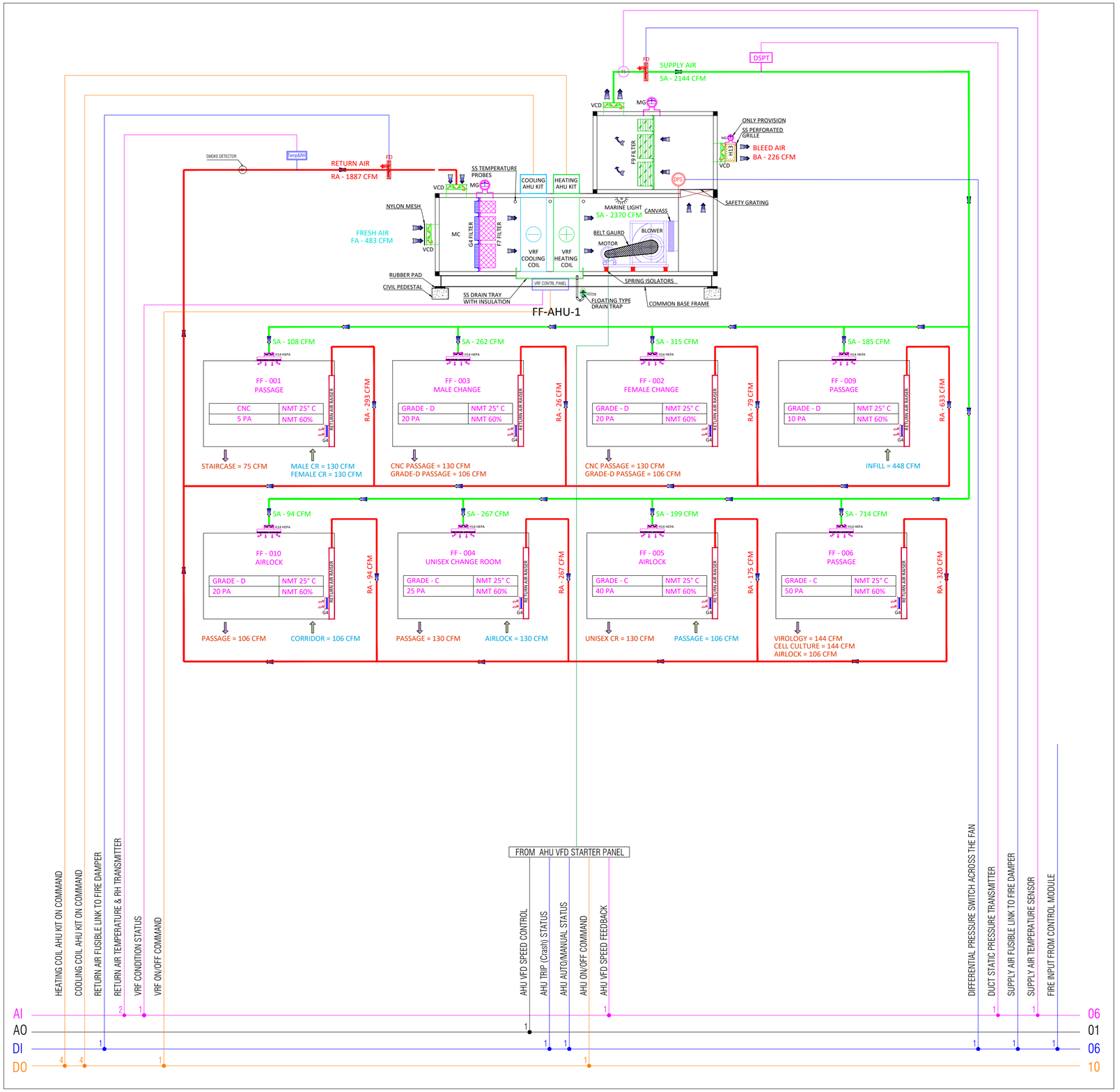
❖ AHU IO Summary List for DDC Panel:

IO SUMMARY FOR AHU							
Sr. No.	**Description**	**AI**	**DI**	**AO**	**DO**	**From**	**To**
	DDC PANEL-1 (GF-AHU-01, GF-EAU-1 & GF-AHU-02)						
1	Return Air fusible link Fire Damper Open/Close Status		2			DDC	Return Air fusible link Fire Damper
2	Return Air Temperature Sensor	1				DDC	Near AHU
3	Return Air Temperature & Rh Transmitter	2				DDC	Near AHU
4	VRF ON / OFF Command				2	DDC	Near AHU
5	VRF Condition Status	2				DDC	Near AHU
6	Heating Coil AHU kit ON Command				4	DDC	Near AHU
7	Cooling Coil AHU kit ON Command				4	DDC	Near AHU
8	AHU VFD Speed control			3		DDC	Electrical Panel
9	AHU trip (Crash) Status		3			DDC	Electrical Panel
10	AHU Auto/Manual Status		3			DDC	Electrical Panel
11	AHU VFD Speed feed back	3				DDC	Electrical Panel
12	AHU VFD ON/OFF command				3	DDC	Electrical Panel
13	EAU VFD Speed control			1		DDC	Electrical Panel
14	EAU trip (Crash) Status		1			DDC	Electrical Panel
15	EAU Auto/Manual Status		1			DDC	Electrical Panel
16	EAU VFD Speed feed back	1				DDC	Electrical Panel
17	EAU VFD ON/OFF command				1	DDC	Electrical Panel
18	Supply Air fusible link Fire Damper Open/Close Status		2			DDC	Supply Air fusible link Fire Damper
19	Feedback to Motorized Damper	3				DDC	Motorised Damper
20	Control to Motorized Damper			3		DDC	Motorised Damper
21	Differential Pressure Switch Across the Fan		4			DDC	Near AHU
22	Duct Static Pressure Transmitter	2				DDC	Duct type Pressure sensor
23	ON/OFF pushbutton command for Cell bank Repository room				1	DDC	ON/OFF Push Button

IO SUMMARY FOR AHU							
Sr. No.	**Description**	**AI**	**DI**	**AO**	**DO**	**From**	**To**
24	ON/OFF pushbutton command for Cell Freezing area-2 isolation room				1	DDC	ON/OFF Push Button
25	Supply Air Temperature Sensor	2				DDC	Duct type Temperature sensor
26	Fire input from control module		2			DDC	FAS control module
	TOTAL	16	18	7	16		
	Spare	3	4	1	3		
	GRAND TOTAL FOR DDC PANEL-1	**19.2**	**22**	**8**	**19**		
	DDC PANEL-2 (GF-AHU-03, GF-AHU-04 & GF-AHU-05)						
1	Return Air fusible link Fire Damper Open/Close Status		3			DDC	Return Air fusible link Fire Damper
2	Return Air Rh & Temperature Transmitter	6				DDC	Near AHU
3	VRF ON / OFF Command				3	DDC	Near AHU
4	VRF Condition Status	3				DDC	Near AHU
5	Heating Coil AHU kit ON Command				12	DDC	Near AHU
6	Cooling Coil AHU kit ON Command				12	DDC	Near AHU
7	AHU VFD Speed control			3		DDC	Electrical Panel
8	AHU trip (Crash) Status		3			DDC	Electrical Panel
9	AHU Auto/Manual Status		3			DDC	Electrical Panel
10	AHU VFD Speed feed back	3				DDC	Electrical Panel
11	AHU VFD ON/OFF command				3	DDC	Electrical Panel
12	Supply Air fusible link Fire Damper Open/Close Status		3			DDC	Supply Air fusible link Fire Damper
13	Differential Pressure Switch Across the Fan		3			DDC	Near AHU
14	Fresh Air Motorized Damper Feedback	1				DDC	Motorised Damper
15	Fresh Air Motorized Damper Control			1		DDC	Motorised Damper
16	For Ambient Temperature sensor	1				DDC	Ambient Temperature Sensor
17	Duct Static Pressure Transmitter	3				DDC	Duct type Pressure sensor
18	Supply Air Temperature Sensor	3				DDC	Duct type Temperature sensor
19	Fire input from control module		3			DDC	FAS control module
	TOTAL	20	18	4	30		

IO SUMMARY FOR AHU							
Sr. No.	**Description**	**AI**	**DI**	**AO**	**DO**	**From**	**To**
	Spare	4	4	1	6		
	GRAND TOTAL FOR DDC PANEL-2	**24**	**22**	**5**	**36**		
	DDC PANEL-3 (FF-AHU-01, FF-EAU-1, FF-AHU-02, FF-AHU-03, FF-AHU-04 with SCB-01)						
1	Return Air fusible link Fire Damper Open/Close Status		4			DDC	Return Air fusible link Fire Damper
2	Return Air Temperature & Rh Transmitter	8				DDC	Near AHU
3	VRF ON / OFF Command				4	DDC	Near AHU
4	VRF Condition Status	4				DDC	Near AHU
5	Heating Coil AHU kit ON Command				16	DDC	Near AHU
6	Cooling Coil AHU kit ON Command				16	DDC	Near AHU
7	AHU VFD Speed control			4		DDC	Electrical Panel
8	AHU trip (Crash) Status		4			DDC	Electrical Panel
9	AHU Auto/Manual Status		4			DDC	Electrical Panel
10	AHU VFD Speed feed back	4				DDC	Electrical Panel
11	AHU VFD ON/OFF command				4	DDC	Electrical Panel
12	EAU VFD Speed control			1		DDC	Electrical Panel
13	EAU trip (Crash) Status		1			DDC	Electrical Panel
14	EAU Auto/Manual Status		1			DDC	Electrical Panel
15	EAU VFD Speed feed back	1				DDC	Electrical Panel
16	EAU VFD ON/OFF command				1	DDC	Electrical Panel
17	Fresh Air Motorized Damper Feedback	2				DDC	Motorised Damper
18	Fresh Air Motorized Damper Control			2		DDC	Motorised Damper
19	For Ambient Temperature sensor	1				DDC	Ambient Temperature Sensor
20	Scrubber VFD Speed control			1		DDC	Electrical Panel
21	Scrubber trip (Crash) Status		1			DDC	Electrical Panel
22	Scrubber Auto/Manual Status		1			DDC	Electrical Panel
23	Scrubber Run Status		1			DDC	Electrical Panel
24	Scrubber VFD Speed feed back	1				DDC	Electrical Panel
25	Scrubber VFD ON/OFF command				1	DDC	Electrical Panel
26	Supply Air fusible link Fire Damper Open/Close Status		4			DDC	Supply Air fusible link Fire Damper
27	Feedback to ON/OFF Damper	2				DDC	Motorised Damper
28	Control to ON/OFF Damper			2		DDC	Motorised Damper

IO SUMMARY FOR AHU							
Sr. No.	**Description**	**AI**	**DI**	**AO**	**DO**	**From**	**To**
29	Differential Pressure Switch Across the Fan		5			DDC	Near AHU
30	Supply Air Temperature Sensor	4				DDC	Duct type Temperature sensor
31	Duct Static Pressure Transmitter	4				DDC	Duct type Pressure sensor
32	Fire input from control module		4			DDC	FAS control module
	TOTAL	31	30	10	42		
	Spare	6	6	2	8		
	GRAND TOTAL FOR DDC PANEL-3	**37.2**	**36**	**12**	**50**		
	AI - Analogue Input						
	DI - Digital Input						
	AO - Analogue Output						
	DO - Digital Output						



LEGEND

	VOLUME CONTROL DAMPER
	RETURN AIR RAISER WITH PRE FILTER
	VRF COOLING COIL
	VRF HEATING COIL
	FIRE DAMPER
	SUPPLY AIR HEPA MODULE WITH OBD (WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822)
	MAGNEHELIC GAUGE
	SUPPLY AIR DUCT
	RETURN AIR DUCT
G4	PRE FILTER WITH AVERAGE ARRESTANCE NOT LESS THAN 90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 3 TO 10 MICRON
F7	FINE FILTER WITH AVERAGE ARRESTANCE OF 80-90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 1 TO 3 MICRON
F9	FINE FILTER WITH NOT LESS THAN 95% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 0.3 TO 1 MICRON
H14	(WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822) OF PARTICLE SIZE 0.3 MICRON

UNIT NO.	FF-AHU-1
CLASSIFICATION	GRADE 'C'
UNIT BLOWER CFM	2370 CFM
COOLING COIL (TR)	8.0 TR
HEATING COIL (KW)	13.0 KW
TEMPERATURE (°C)	NMT 25° C
RELATIVE HUMIDITY (%)	NMT 60%

NOTE :-
THE UNIT SHOWN IN THE AIRFLOW DIAGRAM IS ONLY PICTORIAL REPRESENTATION AND AT ACTUAL IT WILL BE AS PER THE APPROVED G A DRAWING.

SEQUENCE OF OPERATION :-

- Based on program time schedule, switching ON/OFF AHU supply air plug fan.
- Only on the AHU being ON, VRF outdoor unit should start.
- Based on comparison between Supply air CFM through the duct static pressure transmitter & set point CFM, the Supply air plug fan VFD shall be Monitored and set the range for control.
- Monitor the Supply air plug fan Auto/Manual status,Trip status, Run status VFD Speed RPM.
- Monitor the temperature & Rh in return air.
- Monitor the fan status through Differential Pressure Switch which is to be installed across the FAN.
- Monitoring of fire status via duct smoke detector, In case of fire in the AHU or in the catering rooms Supply air AHU supply air plug fan should be turned off.

Logic of control for Temperature & Rh :-

- Temperature is controlled by VRF Controller.
- RH is controlled by the VRF Heating coil Kit based on the return air RH temperature feed back from the External DDC controller .The signal from the DDC controller shall be in the form of NO/NC to the VRF AHU Kit controller based on the RH sensed in the return air duct RH sensor and the Algorithm set in the DDC.
- The Temperature sensor positioned in the SA duct shall give a feed back of the SA to the DDC controller to prevent overheating of the SA.

REVISIONS :

NO	DESCRIPTION	DATE	BY

LEGENDS:

SD	SMOKE DETECTOR
RH	RH TRANSMITTER
TS	TEMPERATURE SENSOR
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
DPS	DIFFERENTIAL PRESSURE SWITCH
DSPT	DUCT STATIC PRESSURE TRANSMITTER
	FIRE DAMPER WITH FUSIBLE LINK
	CHILLED WATER VALVES ACTUATOR
	HOT WATER VALVES ACTUATOR
Temp&RH	TEMPERATURE AND RELATIVE HUMIDITY COMBO TRANSMITTER

TECHNICAL CONSULTANTS:

MJA PHARMATECH PVT. LTD.,
#45, 1st Floor, 5th Cross, 8th Main Road,
Vasanthanagar, Bangalore - 560 052.
Tel: +91-80-2220 4636/222 84583 /41131518

LEAD CONSULTANT:

M/s. SHRIYATA LIFETECH PVT LTD.,
B-1702, BRIGADE GATEWAY, 26/1, DR. RAJKUMAR ROAD,
MALLESWARAM WEST, BANGALORE.

CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University
Campus, PUNE.

PROJECT :

ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

DRAWING TITLE:

CONTROL FLOW DIAGRAM FOR FF-AHU-1

DATE	10.07.2023	
DRAWN	YL	
CHECKED	SC	REVISION
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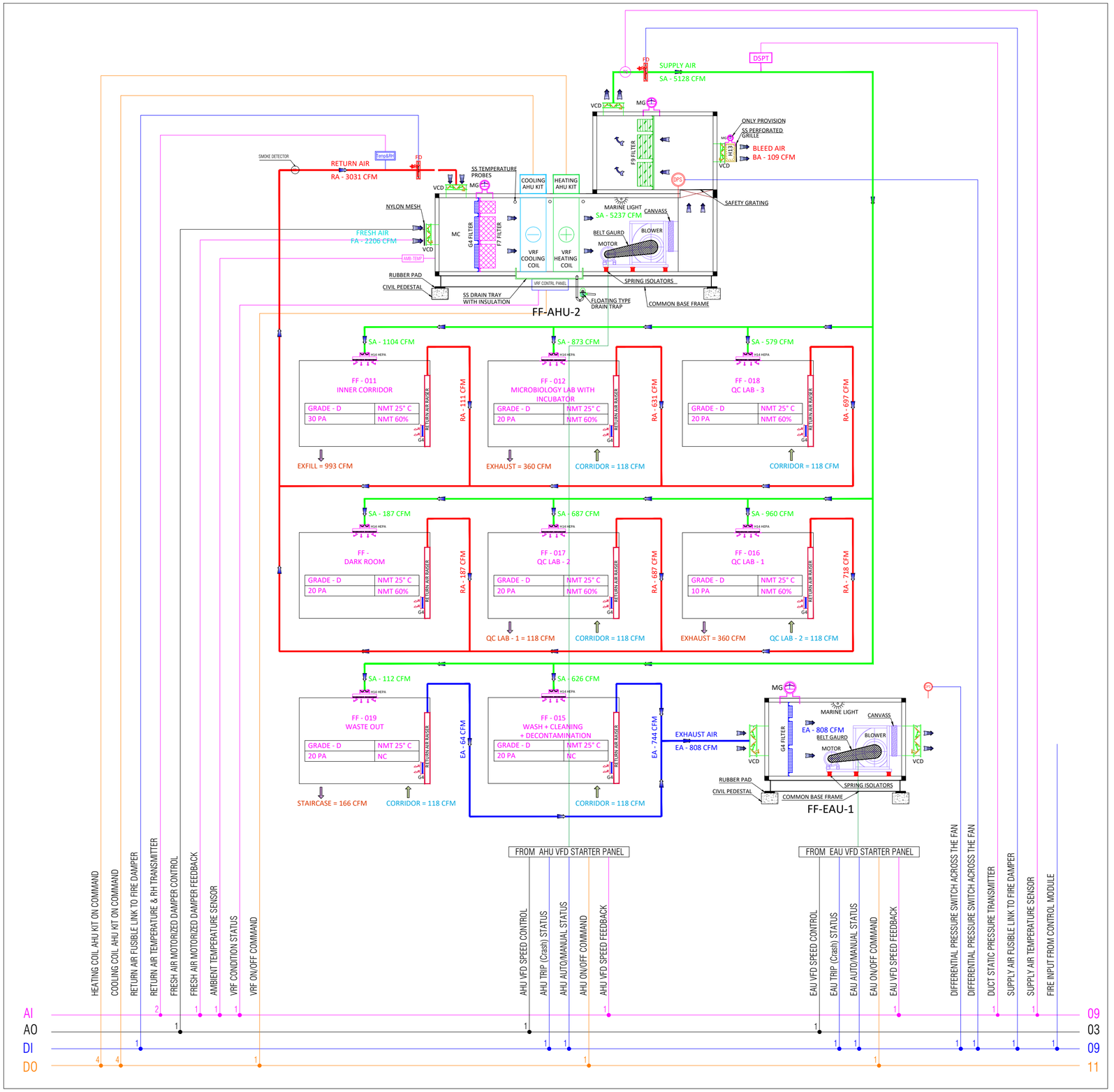
SCALE	NTS	PAGE - A0
DRAWING NO.	MJ 437 - HC - DR - 3306	



LEGEND

	VOLUME CONTROL DAMPER
	RETURN AIR RAISER WITH PRE FILTER
	VRF COOLING COIL
	VRF HEATING COIL
FD	FIRE DAMPER
H14 HEPA	SUPPLY AIR HEPA MODULE WITH OBD (WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822)
MG	MAGNEHELIC GAUGE
	SUPPLY AIR DUCT
	RETURN AIR DUCT
G4	PRE FILTER WITH AVERAGE ARRESTANCE NOT LESS THAN 90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 3 TO 10 MICRON
F7	FINE FILTER WITH AVERAGE ARRESTANCE OF 80-90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 1 TO 3 MICRON
F9	FINE FILTER WITH NOT LESS THAN 95% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 0.3 TO 1 MICRON
H14	(WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822) OF PARTICLE SIZE 0.3 MICRON

UNIT NO.	FF-AHU-2 / FF-EAU-1
CLASSIFICATION	GRADE 'D'
UNIT BLOWER CFM	5237 CFM / 808 CFM
COOLING COIL (TR)	24.0 TR
HEATING COIL (KW)	26.0 KW
TEMPERATURE (°C)	NMT 25° C
RELATIVE HUMIDITY (%)	NMT 60%

NOTE :-
THE UNIT SHOWN IN THE AIRFLOW DIAGRAM IS ONLY PICTORIAL REPRESENTATION AND AT ACTUAL IT WILL BE AS PER THE APPROVED G A DRAWING.

SEQUENCE OF OPERATION :-

- Based on program time schedule, switching ON/OFF AHU supply air plug fan.
- Only on the AHU being ON, VRF outdoor unit should start.
- Based on comparison between Supply air CFM through the duct static pressure transmitter & set point CFM, the Supply air plug fan VFD shall be Monitored and set the range for control.
- Monitor the Supply air plug fan Auto/Manual status,Trip status, Run status VFD Speed RPM.
- Monitor the temperature & Rh in return air.
- Monitor the fan status through Differential Pressure Switch which is to be installed across the FAN.
- Monitoring of fire status via duct smoke detector, In case of fire in the AHU or in the catering rooms Supply air AHU supply air plug fan should be turned off.
- Once the Ambient temperature decreases to less than 10 degree celsius, fresh air damper is closed.

Logic of control for Temperature & Rh :-

- Temperature is controlled by VRF Controller.
- RH is controlled by the VRF Heating coil Kit based on the return air RH temperature feed back from the External DDC controller .The signal from the DDC controller shall be in the form of NO/NC to the VRF AHU Kit controller based on the RH sensed in the return air duct RH sensor and the Algorithm set in the DDC.
- The Temperature sensor positioned in the SA duct shall give a feed back of the SA to the DDC controller to prevent overheating of the SA.

REVISIONS :

NO	DESCRIPTION	DATE	BY

LEGENDS:

SD	SMOKE DETECTOR
RH	RH TRANSMITTER
TS	TEMPERATURE SENSOR
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
DPS	DIFFERENTIAL PRESSURE SWITCH
DSPT	DUCT STATIC PRESSURE TRANSMITTER
	FIRE DAMPER WITH FUSIBLE LINK
	CHILLED WATER VALVES ACTUATOR
	HOT WATER VALVES ACTUATOR
Temp&RH	TEMPERATURE AND RELATIVE HUMIDITY COMBO TRANSMITTER

TECHNICAL CONSULTANTS:

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B-1702, BRIGADE GATEWAY, 26/1, DR. RAJKUMAR ROAD,
MALLESWARAM WEST, BANGALORE.

CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University
Campus, PUNE.

PROJECT :

ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

DRAWING TITLE:

CONTROL FLOW DIAGRAM FOR FF-AHU-2

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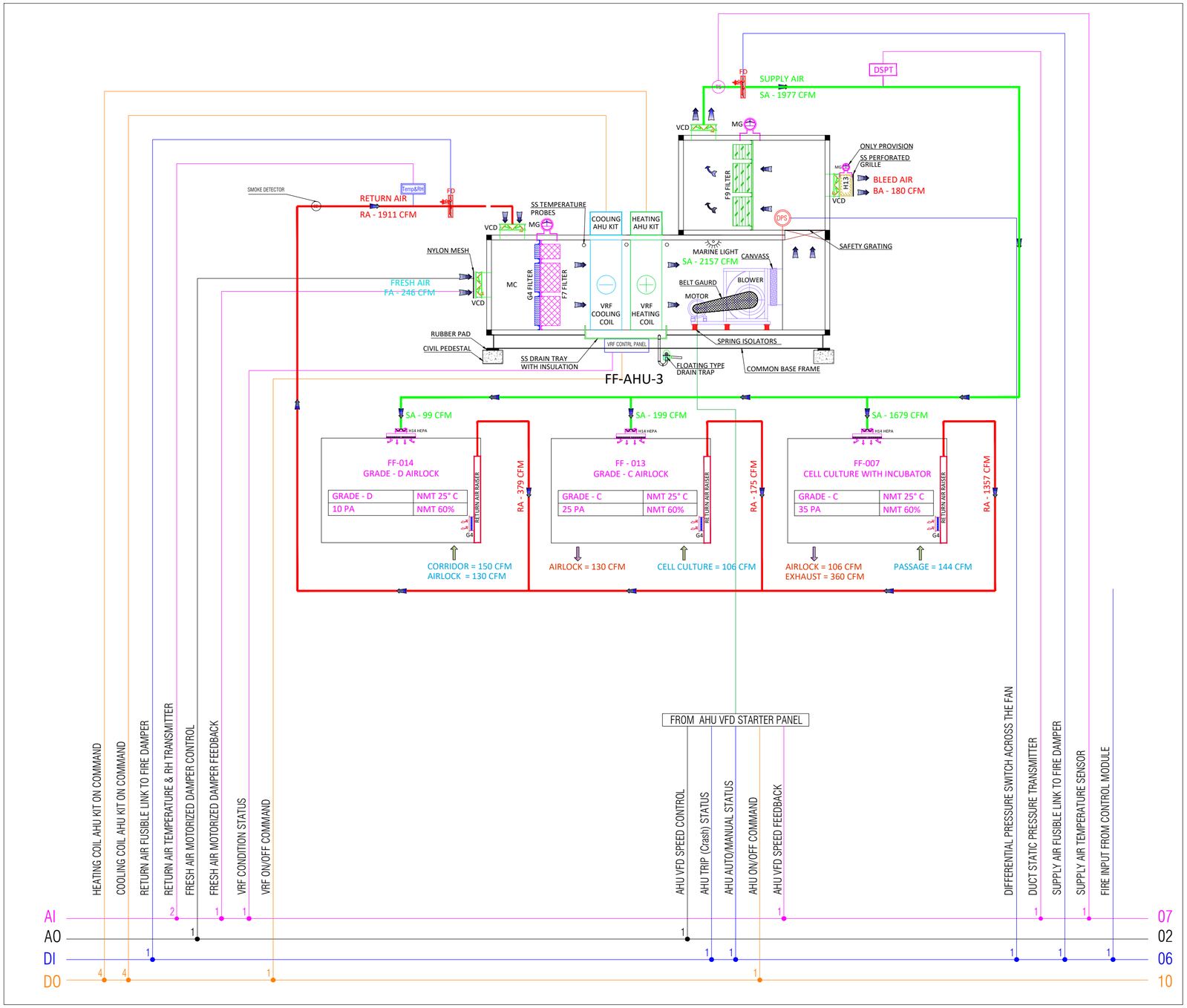

LEGEND

	VOLUME CONTROL DAMPER
	RETURN AIR RAISER WITH PRE FILTER
	VRF COOLING COIL
	VRF HEATING COIL
FD	FIRE DAMPER
H14 HEPA	SUPPLY AIR HEPA MODULE WITH OBD (WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822)
MG	MAGNEHELIC GAUGE
	SUPPLY AIR DUCT
	RETURN AIR DUCT
G4	PRE FILTER WITH AVERAGE ARRESTANCE NOT LESS THAN 90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 3 TO 10 MICRON
F7	FINE FILTER WITH AVERAGE ARRESTANCE OF 80-90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 1 TO 3 MICRON
F9	FINE FILTER WITH NOT LESS THAN 95% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 0.3 TO 1 MICRON
H14	(WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822) OF PARTICLE SIZE 0.3 MICRON

UNIT NO.	FF-AHU-3
CLASSIFICATION	GRADE 'C'
UNIT BLOWER CFM	2157 CFM
COOLING COIL (TR)	7.0 TR
HEATING COIL (KW)	11.0 KW
TEMPERATURE (°C)	NMT 25° C
RELATIVE HUMIDITY (%)	NMT 60%

NOTE :-
THE UNIT SHOWN IN THE AIRFLOW DIAGRAM IS ONLY PICTORIAL REPRESENTATION AND AT ACTUAL IT WILL BE AS PER THE APPROVED G A DRAWING.

SEQUENCE OF OPERATION :-

- Based on program time schedule, switching ON/OFF AHU supply air plug fan.
- Only on the AHU being ON, VRF outdoor unit should start.
- Based on comparison between Supply air CFM through the duct static pressure transmitter & set point CFM, the Supply air plug fan VFD shall be Monitored and set the range for control.
- Monitor the Supply air plug fan Auto/Manual status,Trip status, Run status VFD Speed RPM.
- Monitor the temperature & Rh in return air.
- Monitor the fan status through Differential Pressure Switch which is to be installed across the FAN.
- Monitoring of fire status via duct smoke detector, In case of fire in the AHU or in the catering rooms Supply air AHU supply air plug fan should be turned off.
- Once the Ambient temperature decreases to less than 10 degree celsius, fresh air damper is closed.

Logic of control for Temperature & Rh :-

- Temperature is controlled by VRF Controller.
- RH is controlled by the VRF Heating coil Kit based on the return air RH temperature feed back from the External DDC controller .The signal from the DDC controller shall be in the form of NO/NC to the VRF AHU Kit controller based on the RH sensed in the return air duct RH sensor and the Algorithm set in the DDC.
- The Temperature sensor positioned in the SA duct shall give a feed back of the SA to the DDC controller to prevent overheating of the SA.

REVISIONS :

NO	DESCRIPTION	DATE	BY

LEGENDS:

SD	SMOKE DETECTOR
RH	RH TRANSMITTER
TS	TEMPERATURE SENSOR
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
DPS	DIFFERENTIAL PRESSURE SWITCH
DSPT	DUCT STATIC PRESSURE TRANSMITTER
	FIRE DAMPER WITH FUSIBLE LINK
	CHILLED WATER VALVES ACTUATOR
	HOT WATER VALVES ACTUATOR
Temp&RH	TEMPERATURE AND RELATIVE HUMIDITY COMBO TRANSMITTER

TECHNICAL CONSULTANTS:

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MALLESWARAM WEST, BANGALORE.

CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University
Campus, PUNE.

PROJECT :

ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

DRAWING TITLE:

CONTROL FLOW DIAGRAM FOR FF-AHU-3

DATE	10.07.2023	
DRAWN	YL	
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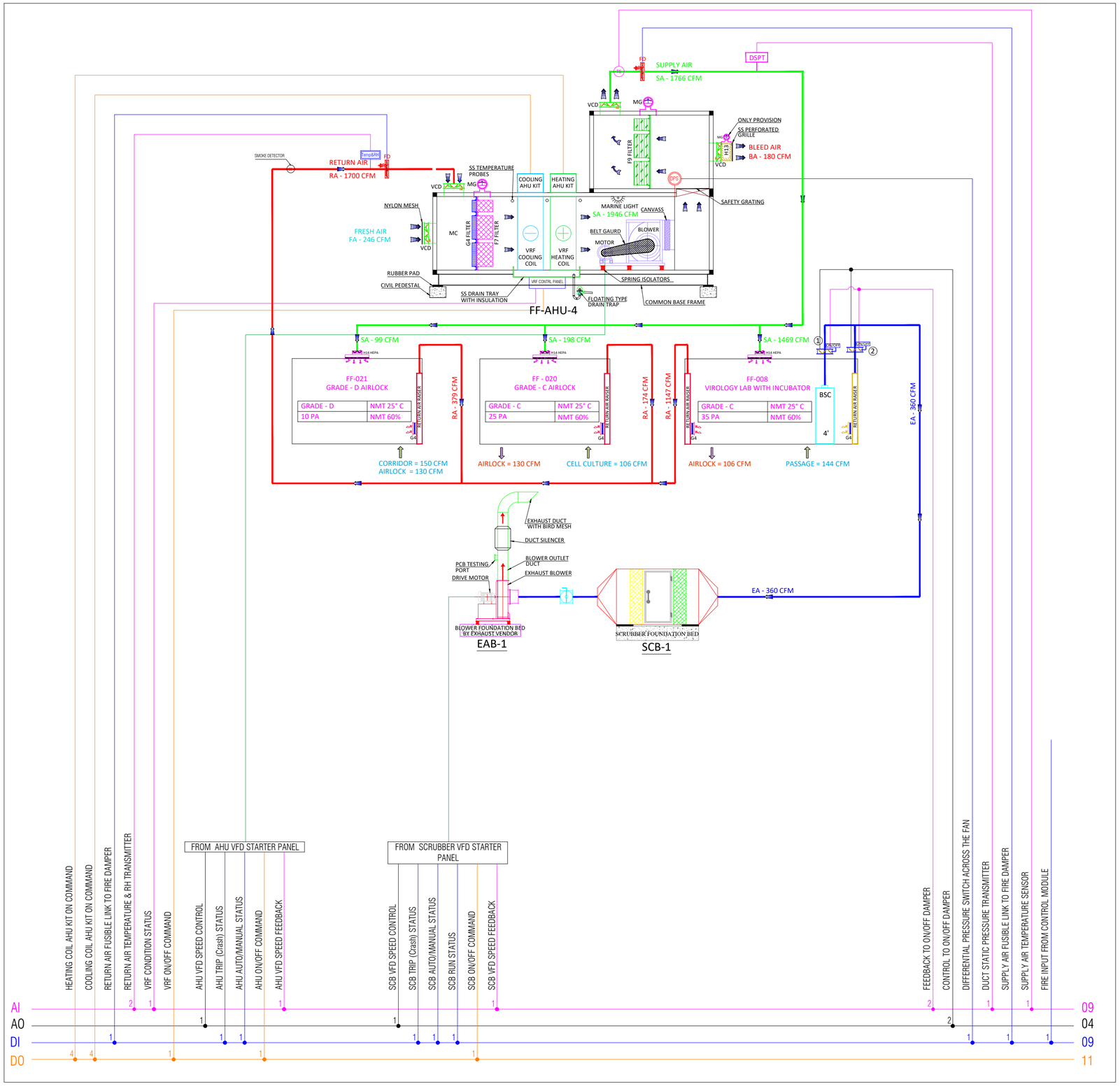

LEGEND

	VOLUME CONTROL DAMPER
	RETURN AIR RAISER WITH PRE FILTER
	VRF COOLING COIL
	VRF HEATING COIL
FD	FIRE DAMPER
H14 HEPA	SUPPLY AIR HEPA MODULE WITH OBD (WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822)
MG	MAGNEHELIC GAUGE
	SUPPLY AIR DUCT
	RETURN AIR DUCT
G4	PRE FILTER WITH AVERAGE ARRESTANCE NOT LESS THAN 90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 3 TO 10 MICRON
F7	FINE FILTER WITH AVERAGE ARRESTANCE OF 80-90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 1 TO 3 MICRON
F9	FINE FILTER WITH NOT LESS THAN 95% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 0.3 TO 1 MICRON
H14	(WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822) OF PARTICLE SIZE 0.3 MICRON

UNIT NO.	FF-AHU-4 / SCB-1
CLASSIFICATION	GRADE 'C'
UNIT BLOWER CFM	1946 CFM / 360 CFM
COOLING COIL (TR)	6.0 TR
HEATING COIL (KW)	9.0 KW
TEMPERATURE (°C)	NMT 25° C
RELATIVE HUMIDITY (%)	NMT 60%

NOTE :-
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SEQUENCE OF OPERATION :-

- Based on program time schedule, switching ON/OFF AHU supply air plug fan.
- Only on the AHU being ON, VRF outdoor unit should start.
- Based on comparison between Supply air CFM through the duct static pressure transmitter & set point CFM, the Supply air plug fan VFD shall be Monitored and set the range for control.
- Monitor the Supply air plug fan Auto/Manual status,Trip status, Run status VFD Speed RPM.
- Monitor the temperature & Rh in return air.
- Monitor the fan status through Differential Pressure Switch which is to be installed across the FAN.
- Monitoring of fire status via duct smoke detector, In case of fire in the AHU or in the catering rooms Supply air AHU supply air plug fan should be turned off.
- When DAMPER 1 is OPENED, DAMPER 2 is CLOSED.
- When DAMPER 2 is OPENED, DAMPER 1 is CLOSED.

Logic of control for Temperature & Rh :-

- Temperature is controlled by VRF Controller.
- RH is controlled by the VRF Heating coil Kit based on the return air RH temperature feed back from the External DDC controller .The signal from the DDC controller shall be in the form of NO/NC to the VRF AHU Kit controller based on the RH sensed in the return air duct RH sensor and the Algorithm set in the DDC.
- The Temperature sensor positioned in the SA duct shall give a feed back of the SA to the DDC controller to prevent overheating of the SA.

REVISIONS :

NO	DESCRIPTION	DATE	BY

LEGENDS:

SD	SMOKE DETECTOR
RH	RH TRANSMITTER
TS	TEMPERATURE SENSOR
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
DPS	DIFFERENTIAL PRESSURE SWITCH
DSPT	DUCT STATIC PRESSURE TRANSMITTER
FD	FIRE DAMPER WITH FUSIBLE LINK
CV	CHILLED WATER VALVES ACTUATOR
HV	HOT WATER VALVES ACTUATOR
Temp&RH	TEMPERATURE AND RELATIVE HUMIDITY COMBO TRANSMITTER

TECHNICAL CONSULTANTS:

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LEAD CONSULTANT:

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MALLESWARAM WEST, BANGALORE.

CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University Campus, PUNE.

PROJECT :

ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

DRAWING TITLE:

CONTROL FLOW DIAGRAM FOR FF-AHU-4

DATE	10.07.2023	
DRAWN	YL	
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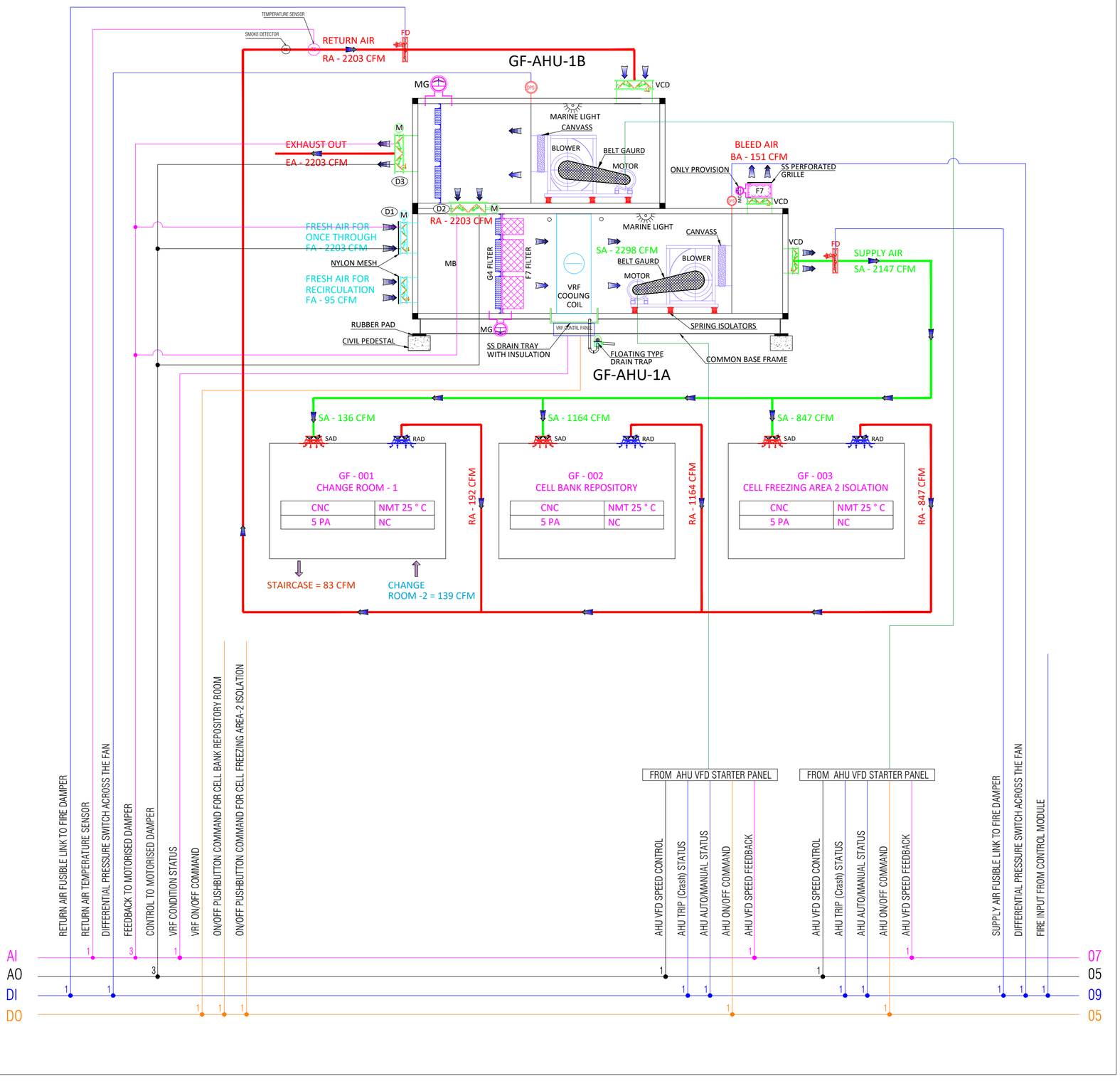
DRAWING NO.	MJ 437 - HC - DR - 3309	



LEGEND

	VOLUME CONTROL DAMPER
	MOTORIZED DAMPER
	VRF COOLING COIL
	FIRE DAMPER
	SUPPLY AIR DIFFUSER (WITH OBD)
	RETURN AIR DIFFUSER (WITH OBD)
	MAGNEHELIC GAUGE
	SUPPLY AIR DUCT
	RETURN AIR DUCT
G4	PRE FILTER WITH AVERAGE ARRESTANCE NOT LESS THAN 90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 3 TO 10 MICRON
F7	FINE FILTER WITH AVERAGE ARRESTANCE OF 80-90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 1 TO 3 MICRON

UNIT NO.	GF-AHU-1
CLASSIFICATION	CUC
UNIT BLOWER CFM	2233 CFM
COOLING COIL (TR)	8.0 TR
TEMPERATURE (°C)	NMT 25 ° C
RELATIVE HUMIDITY (%)	NC

NOTE :-
THE UNIT SHOWN IN THE AIRFLOW DIAGRAM IS ONLY PICTORIAL REPRESENTATION AND AT ACTUAL IT WILL BE AS PER THE APPROVED G A DRAWING.

SEQUENCE OF OPERATION :-

- Based on program time schedule, switching ON/OFF AHU supply air plug fan.
- Based on comparison between Supply air CFM through the duct static pressure transmitter & set point CFM, the Supply air plug fan VFD shall be Monitored and set the range for control.
- Monitor the Supply air plug fan Auto/Manual status,Trip status, Run status VFD Speed RPM.
- Monitor the temperature and Rh in return air.
- Monitor the fan status through Differential Pressure Switch which is to be installed across the FAN.
- Monitoring of fire status via duct smoke detector, In case of fire in the AHU or in the catering rooms Supply air AHU supply air plug fan should be turned off.
- Control Sequence for Recirculation mode:
  - Damper D1 & D3 closed
  - Damper D2 opens
- Control Sequence for Once through mode:
  - Damper D2 closed
  - Damper D1 & D3 opens
- Recirculation and once through mode depends on the oxygen level inside the room.
- During once through exhaust mode, the room temperature and pressure shall vary.
- Monitoring of Gas leakage via Gas detector, in case of Gas leakage inside the catering rooms, push button shall be turned ON whch in turn switches ON the Exhaust air fans shall run continuously and return air fire damper should be closed and run as per once through system.

REVISIONS :

NO	DESCRIPTION	DATE	BY

LEGENDS:

SD	SMOKE DETECTOR
RH	RH TRANSMITTER
TS	TEMPERATURE SENSOR
	DIFFERENTIAL PRESSURE TRANSMITTER
DPS	DIFFERENTIAL PRESSURE SWITCH
DSPT	DUCT STATIC PRESSURE TRANSMITTER
	FIRE DAMPER WITH FUSIBLE LINK
	CHILLED WATER VALVES ACTUATOR
	HOT WATER VALVES ACTUATOR
Temp&Rh	TEMPERATURE AND RELATIVE HUMIDITY COMBO TRANSMITTER

TECHNICAL CONSULTANTS:

MJA PHARMATECH PVT. LTD.,
#45, 1st Floor, 5th Cross, 8th Main Road,
Vasanthanagar, Bangalore - 560 052.
Tel: +91-80-2220 4636/222 84583 /41131518

LEAD CONSULTANT:

M/s. SHRIYATA LIFETECH PVT LTD.,
B-1702, BRIGADE GATEWAY, 26/1, DR. RAJKUMAR ROAD,
MALLESWARAM WEST, BANGALORE.

CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University Campus, PUNE.

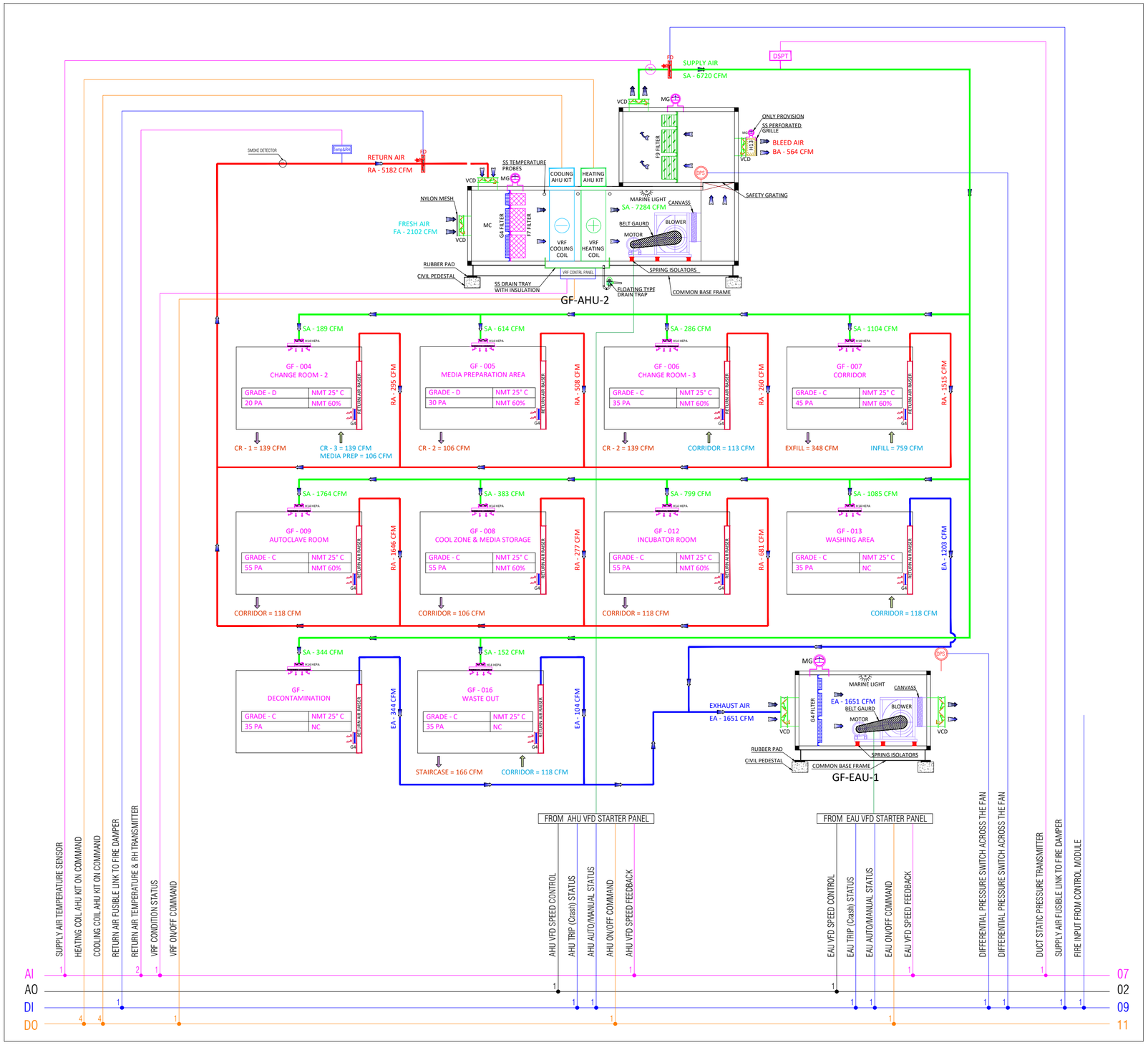
PROJECT :

ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

DRAWING TITLE:

CONTROL FLOW DIAGRAM FOR GF-AHU-1A & GF-AHU-1B

DATE	10.07.2023	
DRAWN	YL	
CHECKED	SC	REVISION
APPROVED	VS / DBS	R0
SCALE	NTS	PAGE - A0
DRAWING NO.	MJ 437 - HC - DR - 3301	



LEGEND

	VOLUME CONTROL DAMPER
	RETURN AIR RAISER WITH PRE FILTER
	VRF COOLING COIL
	VRF HEATING COIL
FD	FIRE DAMPER
H14 HEPA	SUPPLY AIR HEPA MODULE WITH OBD (WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822)
MG	MAGNEHELIC GAUGE
	SUPPLY AIR DUCT
	RETURN AIR DUCT
G4	PRE FILTER WITH AVERAGE ARRESTANCE NOT LESS THAN 90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 3 TO 10 MICRON
F7	FINE FILTER WITH AVERAGE ARRESTANCE OF 80-90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 1 TO 3 MICRON
F9	FINE FILTER WITH NOT LESS THAN 95% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 0.3 TO 1 MICRON
H14	(WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822) OF PARTICLE SIZE 0.3 MICRON

UNIT NO.	GF-AHU-2 / GF-EAU-1
CLASSIFICATION	GRADE 'C'
UNIT BLOWER CFM	7387 CFM / 1651 CFM
COOLING COIL (TR)	26.0 TR
HEATING COIL (KW)	29.0 KW
TEMPERATURE (°C)	NMT 25° C
RELATIVE HUMIDITY (%)	NMT 60%

NOTE :-
THE UNIT SHOWN IN THE AIRFLOW DIAGRAM IS ONLY PICTORIAL REPRESENTATION AND AT ACTUAL IT WILL BE AS PER THE APPROVED G A DRAWING.

SEQUENCE OF OPERATION :-

- Based on program time schedule, switching ON/OFF AHU supply air plug fan.
- Only on the AHU being ON, VRF outdoor unit should start.
- Based on comparison between Supply air CFM through the duct static pressure transmitter & set point CFM, the Supply air plug fan VFD shall be Monitored and set the range for control.
- Monitor the Supply air plug fan Auto/Manual status,Trip status, Run status VFD Speed RPM.
- Monitor the temperature & Rh in return air.
- Monitor the fan status through Differential Pressure Switch which is to be installed across the FAN.
- Monitoring of fire status via duct smoke detector, In case of fire in the AHU or in the catering rooms Supply air AHU supply air plug fan should be turned off.

Logic of control for Temperature & Rh :-

- Temperature is controlled by VRF Controller.
- RH is controlled by the VRF Heating coil Kit based on the return air RH temperature feed back from the External DDC controller .The signal from the DDC controller shall be in the form of NO/NC to the VRF AHU Kit controller based on the RH sensed in the return air duct RH sensor and the Algorithm set in the DDC.
- The Temperature sensor positioned in the SA duct shall give a feed back of the SA to the DDC controller to prevent overheating of the SA.

REVISIONS :

NO	DESCRIPTION	DATE	BY

LEGENDS:

SD	SMOKE DETECTOR
RH	RH TRANSMITTER
TS	TEMPERATURE SENSOR
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
DPS	DIFFERENTIAL PRESSURE SWITCH
DSPT	DUCT STATIC PRESSURE TRANSMITTER
	FIRE DAMPER WITH FUSIBLE LINK
	CHILLED WATER VALVES ACTUATOR
	HOT WATER VALVES ACTUATOR
TempMtr	TEMPERATURE AND RELATIVE HUMIDITY COMBO TRANSMITTER

TECHNICAL CONSULTANTS:

MJA PHARMATECH PVT. LTD.,
#45, 1st Floor, 5th Cross, 8th Main Road,
Vasanthanagar, Bangalore - 560 052.
Tel: +91-80-2220 4636/222 84583 /41131518

LEAD CONSULTANT:

M/s. SHRIYATA LIFETECH PVT LTD.,
B-1702, BRIGADE GATEWAY, 26/1, DR. RAJKUMAR ROAD,
MALLESWARAM WEST, BANGALORE.

CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University
Campus, PUNE.

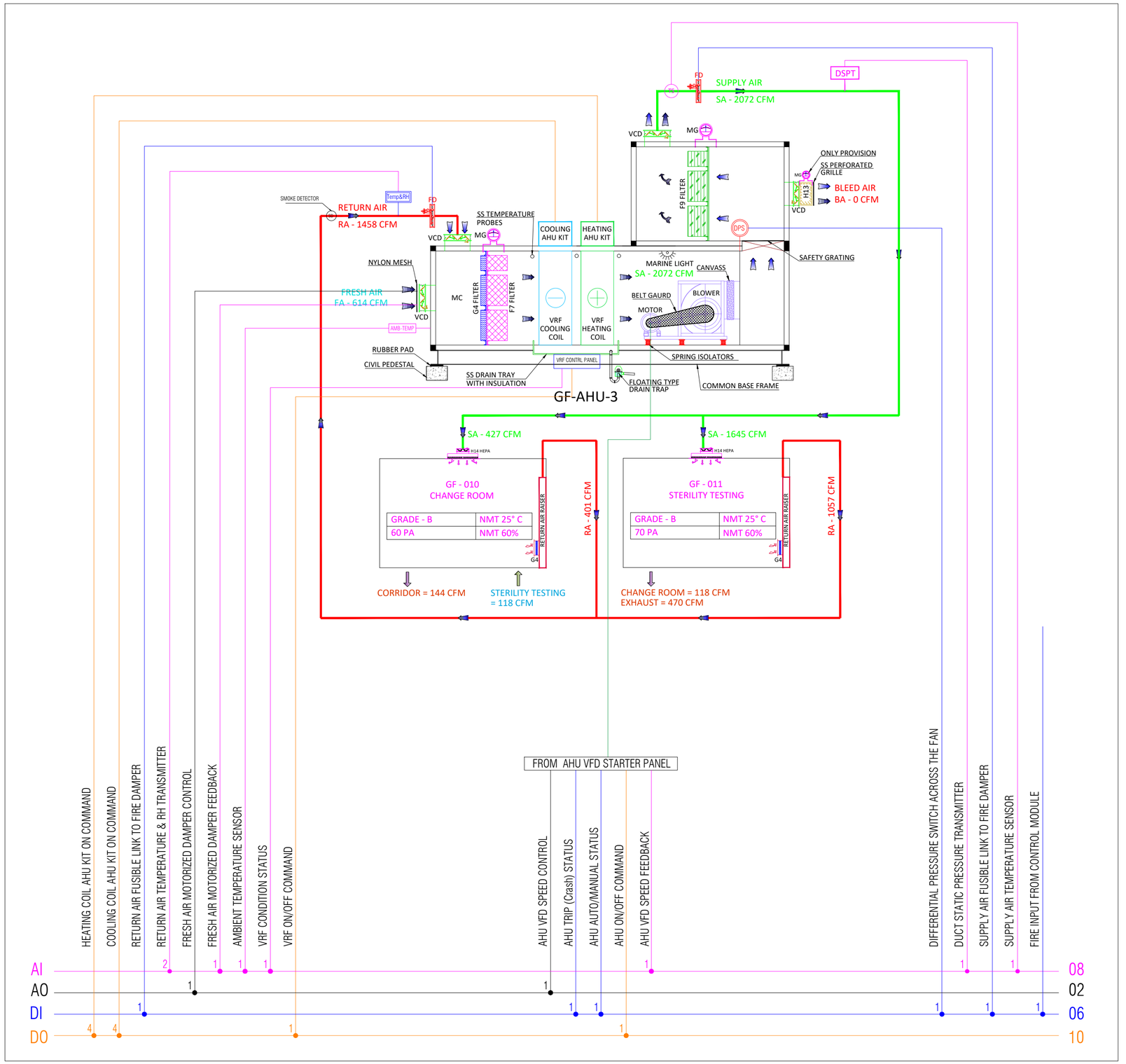
PROJECT :

ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

DRAWING TITLE:

CONTROL FLOW DIAGRAM FOR GF-AHU-2

DATE	10.07.2023	
DRAWN	YL	
CHECKED	SC	REVISION
APPROVED	VS / DBS	R0
SCALE	NTS	PAGE - A0
DRAWING NO.	MJ 437 - HC - DR - 3302	



LEGEND

	VOLUME CONTROL DAMPER
	RETURN AIR RAISER WITH PRE FILTER
	VRF COOLING COIL
	VRF HEATING COIL
FD	FIRE DAMPER
H14 HEPA	SUPPLY AIR HEPA MODULE WITH OBD (WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822)
MG	MAGNEHELIC GAUGE
	SUPPLY AIR DUCT
	RETURN AIR DUCT
G4	PRE FILTER WITH AVERAGE ARRESTANCE NOT LESS THAN 90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 3 TO 10 MICRON
F7	FINE FILTER WITH AVERAGE ARRESTANCE OF 80-90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 1 TO 3 MICRON
F9	FINE FILTER WITH NOT LESS THAN 95% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 0.3 TO 1 MICRON
H14	(WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822) OF PARTICLE SIZE 0.3 MICRON

UNIT NO.	GF-AHU-3
CLASSIFICATION	GRADE 'B'
UNIT BLOWER CFM	2072 CFM
COOLING COIL (TR)	9.0 TR
HEATING COIL (KW)	11.0 KW
TEMPERATURE (°C)	NMT 25° C
RELATIVE HUMIDITY (%)	NMT 60%

NOTE :-
THE UNIT SHOWN IN THE AIRFLOW DIAGRAM IS ONLY PICTORIAL REPRESENTATION AND AT ACTUAL IT WILL BE AS PER THE APPROVED G A DRAWING.

SEQUENCE OF OPERATION :-

- Based on program time schedule, switching ON/OFF AHU supply air plug fan.
- Only on the AHU being ON, VRF outdoor unit should start.
- Based on comparison between Supply air CFM through the duct static pressure transmitter & set point CFM, the Supply air plug fan VFD shall be Monitored and set the range for control.
- Monitor the Supply air plug fan Auto/Manual status,Trip status, Run status VFD Speed RPM.
- Monitor the temperature & Rh in return air.
- Monitor the fan status through Differential Pressure Switch which is to be installed across the FAN.
- Monitoring of fire status via duct smoke detector, In case of fire in the AHU or in the catering rooms Supply air AHU supply air plug fan should be turned off.
- Once the Ambient temperature decreases to less than 10 degree celsius, fresh air damper is closed.

Logic of control for Temperature & Rh :-

- Temperature is controlled by VRF Controller.
- RH is controlled by the VRF Heating coil Kit based on the return air RH temperature feed back from the External DDC controller .The signal from the DDC controller shall be in the form of NO/NC to the VRF AHU Kit controller based on the RH sensed in the return air duct RH sensor and the Algorithm set in the DDC.
- The Temperature sensor positioned in the SA duct shall give a feed back of the SA to the DDC controller to prevent overheating of the SA.

REVISIONS :

NO	DESCRIPTION	DATE	BY

LEGENDS:

SD	SMOKE DETECTOR
RH	RH TRANSMITTER
TS	TEMPERATURE SENSOR
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
DPS	DIFFERENTIAL PRESSURE SWITCH
DSPT	DUCT STATIC PRESSURE TRANSMITTER
	FIRE DAMPER WITH FUSIBLE LINK
	CHILLED WATER VALVES ACTUATOR
	HOT WATER VALVES ACTUATOR
Temp&RH	TEMPERATURE AND RELATIVE HUMIDITY COMBO TRANSMITTER

TECHNICAL CONSULTANTS:

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LEAD CONSULTANT:

M/s. SHRIYATA LIFETECH PVT LTD.,
B-1702, BRIGADE GATEWAY, 26/1, DR. RAJKUMAR ROAD,
MALLESWARAM WEST, BANGALORE.

CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University
Campus, PUNE.

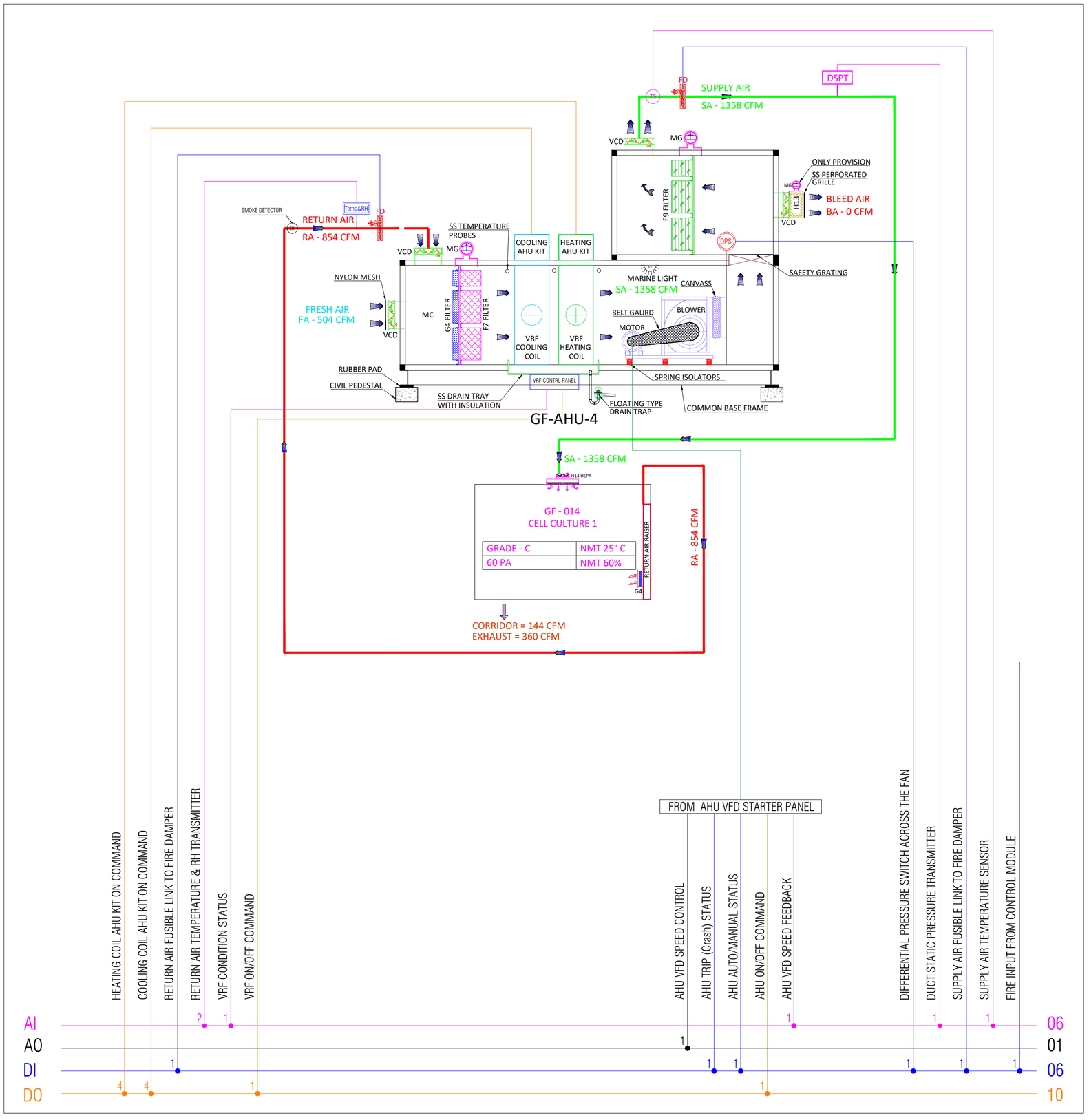
PROJECT :

ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

DRAWING TITLE:

CONTROL FLOW DIAGRAM FOR GF-AHU-3

DATE	10.07.2023	
DRAWN	YL	
CHECKED	SC	REVISION
APPROVED	VS / DBS	R0
SCALE	NTS	PAGE - A0
DRAWING NO.	MJ 437 - HC - DR - 3303	



LEGEND

	VOLUME CONTROL DAMPER
	RETURN AIR RAISER WITH PRE FILTER
	VRF COOLING COIL
	VRF HEATING COIL
	FIRE DAMPER
	SUPPLY AIR HEPA MODULE WITH OBD (WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822)
	MAGNEHELIC GAUGE
	SUPPLY AIR DUCT
	RETURN AIR DUCT
G4	PRE FILTER WITH AVERAGE ARRESTANCE NOT LESS THAN 90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 3 TO 10 MICRON
F7	FINE FILTER WITH AVERAGE ARRESTANCE OF 80-90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 1 TO 3 MICRON
F9	FINE FILTER WITH NOT LESS THAN 95% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 0.3 TO 1 MICRON
H14	(WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822) OF PARTICLE SIZE 0.3 MICRON

UNIT NO.	GF-AHU-4
CLASSIFICATION	GRADE 'C'
UNIT BLOWER CFM	1358 CFM
COOLING COIL (TR)	7.0 TR
HEATING COIL (KW)	9.0 KW
TEMPERATURE (°C)	NMT 25° C
RELATIVE HUMIDITY (%)	NMT 60%

NOTE :-
THE UNIT SHOWN IN THE AIRFLOW DIAGRAM IS ONLY PICTORIAL REPRESENTATION AND AT ACTUAL IT WILL BE AS PER THE APPROVED G A DRAWING.

SEQUENCE OF OPERATION :-

- Based on program time schedule, switching ON/OFF AHU supply air plug fan.
- Only on the AHU being ON, VRF outdoor unit should start.
- Based on comparison between Supply air CFM through the duct static pressure transmitter & set point CFM, the Supply air plug fan VFD shall be Monitored and set the range for control.
- Monitor the Supply air plug fan Auto/Manual status,Trip status, Run status VFD Speed RPM.
- Monitor the temperature & Rh in return air.
- Monitor the fan status through Differential Pressure Switch which is to be installed across the FAN.
- Monitoring of fire status via duct smoke detector, In case of fire in the AHU or in the catering rooms Supply air AHU supply air plug fan should be turned off.

Logic of control for Temperature & Rh :-

- Temperature is controlled by VRF Controller.
- RH is controlled by the VRF Heating coil Kit based on the return air RH temperature feed back from the External DDC controller .The signal from the DDC controller shall be in the form of NO/NC to the VRF AHU Kit controller based on the RH sensed in the return air duct RH sensor and the Algorithm set in the DDC.
- The Temperature sensor positioned in the SA duct shall give a feed back of the SA to the DDC controller to prevent overheating of the SA.

REVISIONS :

NO	DESCRIPTION	DATE	BY

LEGENDS:

SD	SMOKE DETECTOR
RH	RH TRANSMITTER
TS	TEMPERATURE SENSOR
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
DPS	DIFFERENTIAL PRESSURE SWITCH
DSPT	DUCT STATIC PRESSURE TRANSMITTER
	FIRE DAMPER WITH FUSIBLE LINK
	CHILLED WATER VALVES ACTUATOR
	HOT WATER VALVES ACTUATOR
Temp&RH	TEMPERATURE AND RELATIVE HUMIDITY COMBO TRANSMITTER

TECHNICAL CONSULTANTS:

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Vasanthanagar, Bangalore - 560 052.
Tel: +91-80-2220 4636/222 84583 /41131518

LEAD CONSULTANT:

M/s. SHRIYATA LIFETECH PVT LTD.,
B-1702, BRIGADE GATEWAY, 26/1, DR. RAJKUMAR ROAD,
MALLESWARAM WEST, BANGALORE.

CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University Campus, PUNE.

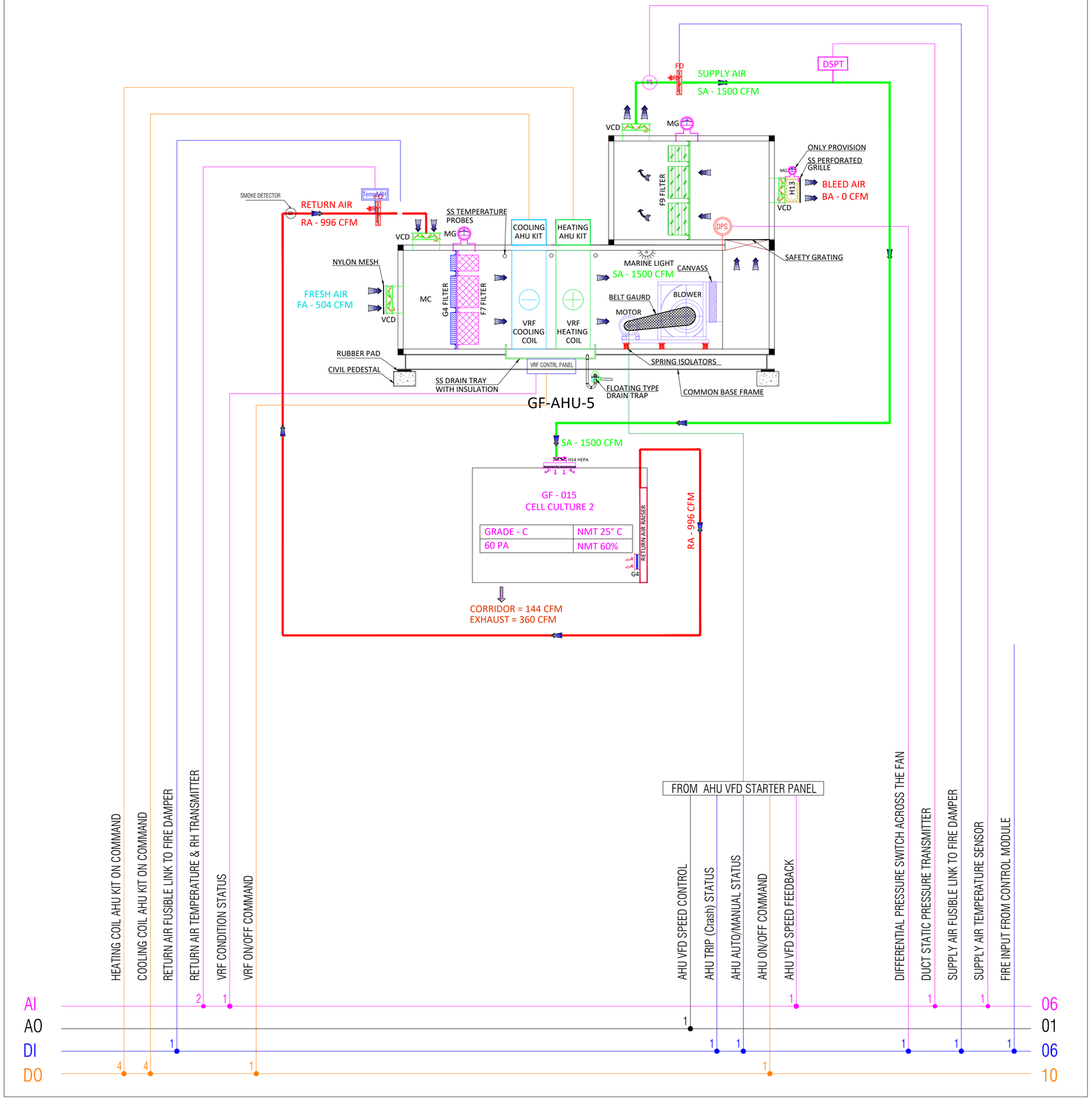
PROJECT :

ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

DRAWING TITLE:

CONTROL FLOW DIAGRAM FOR GF-AHU-4

DATE	10.07.2023	
DRAWN	YL	
CHECKED	SC	REVISION
APPROVED	VS / DBS	R0
SCALE	NTS	PAGE - A0
DRAWING NO.	MJ 437 - HC - DR - 3304	



LEGEND

	VOLUME CONTROL DAMPER
	RETURN AIR RAISER WITH PRE FILTER
	VRF COOLING COIL
	VRF HEATING COIL
	FIRE DAMPER
	SUPPLY AIR HEPA MODULE WITH OBD (WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822)
	MAGNEHELIC GAUGE
	SUPPLY AIR DUCT
	RETURN AIR DUCT
G4	PRE FILTER WITH AVERAGE ARRESTANCE NOT LESS THAN 90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 3 TO 10 MICRON
F7	FINE FILTER WITH AVERAGE ARRESTANCE OF 80-90% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 1 TO 3 MICRON
F9	FINE FILTER WITH NOT LESS THAN 95% AS PER ASHRAE STD 52.2 OF PARTICLE SIZE 0.3 TO 1 MICRON
H14	(WITH H-14 HEPA FILTER HAVING AVERAGE EFF(%@MPPS) OF >99.995 AS PER EN1822) OF PARTICLE SIZE 0.3 MICRON

UNIT N0.	GF-AHU-5
CLASSIFICATION	GRADE 'C'
UNIT BLOWER CFM	1500 CFM
COOLING COIL (TR)	8.0 TR
HEATING COIL (KW)	9.0 KW
TEMPERATURE (°C)	NMT 25° C
RELATIVE HUMIDITY (%)	NMT 60%

NOTE :-
THE UNIT SHOWN IN THE AIRFLOW DIAGRAM IS ONLY PICTORIAL REPRESENTATION AND AT ACTUAL IT WILL BE AS PER THE APPROVED G A DRAWING.

SEQUENCE OF OPERATION :-

- Based on program time schedule, switching ON/OFF AHU supply air plug fan.
- Only on the AHU being ON, VRF outdoor unit should start.
- Based on comparison between Supply air CFM through the duct static pressure transmitter & set point CFM, the Supply air plug fan VFD shall be Monitored and set the range for control.
- Monitor the Supply air plug fan Auto/Manual status,Trip status, Run status VFD Speed RPM.
- Monitor the temperature & Rh in return air.
- Monitor the fan status through Differential Pressure Switch which is to be installed across the FAN.
- Monitoring of fire status via duct smoke detector, In case of fire in the AHU or in the catering rooms Supply air AHU supply air plug fan should be turned off.

Logic of control for Temperature & Rh :-

- Temperature is controlled by VRF Controller.
- RH is controlled by the VRF Heating coil Kit based on the return air RH temperature feed back from the External DDC controller .The signal from the DDC controller shall be in the form of NO/NC to the VRF AHU Kit controller based on the RH sensed in the return air duct RH sensor and the Algorithm set in the DDC.
- The Temperature sensor positioned in the SA duct shall give a feed back of the SA to the DDC controller to prevent overheating of the SA.

REVISIONS :

NO	DESCRIPTION	DATE	BY

LEGENDS:

SD	SMOKE DETECTOR
RH	RH TRANSMITTER
TS	TEMPERATURE SENSOR
	DIFFERENTIAL PRESSURE TRANSMITTER
DPS	DIFFERENTIAL PRESSURE SWITCH
DSPT	DUCT STATIC PRESSURE TRANSMITTER
	FIRE DAMPER WITH FUSIBLE LINK
	CHILLED WATER VALVES ACTUATOR
	HOT WATER VALVES ACTUATOR
Temp&RH	TEMPERATURE AND RELATIVE HUMIDITY COMBO TRANSMITTER

TECHNICAL CONSULTANTS:

MJA PHARMATECH PVT. LTD.,
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Tel: +91-80-2220 4636/222 84583 /41131518

LEAD CONSULTANT:

M/s. SHRIYATA LIFETECH PVT LTD.,
B-1702, BRIGADE GATEWAY, 26/1, DR. RAJKUMAR ROAD,
MALLESWARAM WEST, BANGALORE.

CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University
Campus, PUNE.

PROJECT :

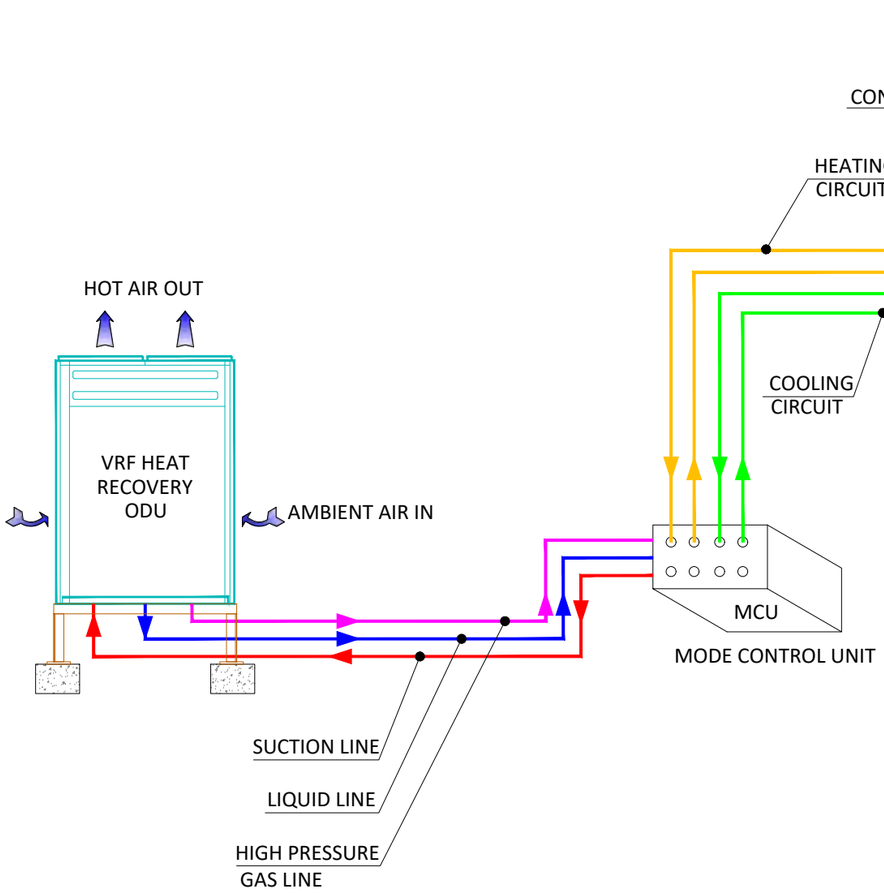
ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

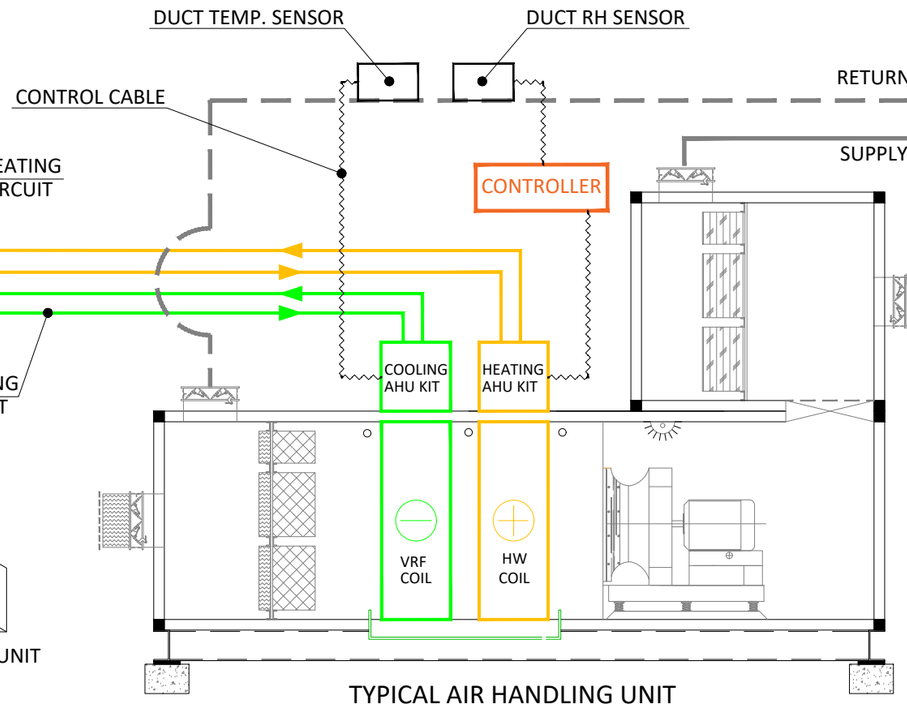
DRAWING TITLE:

CONTROL FLOW DIAGRAM FOR GF-AHU-5

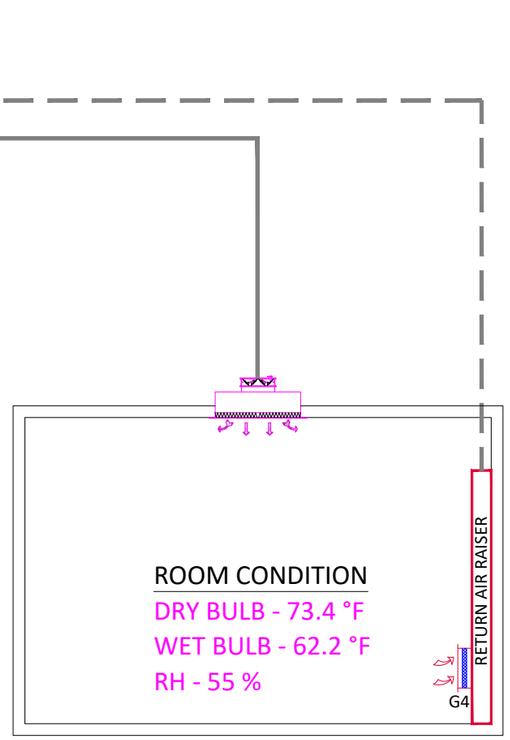
DATE	10.07.2023	
DRAWN	YL	
CHECKED	SC	REVISION
APPROVED	VS / DBS	R0
SCALE	NTS	PAGE - A0
DRAWING NO.	MJ 437 - HC - DR - 3305	

SCHEMATIC REPRESENTATION OF 3 PIPE VRF SYSTEM





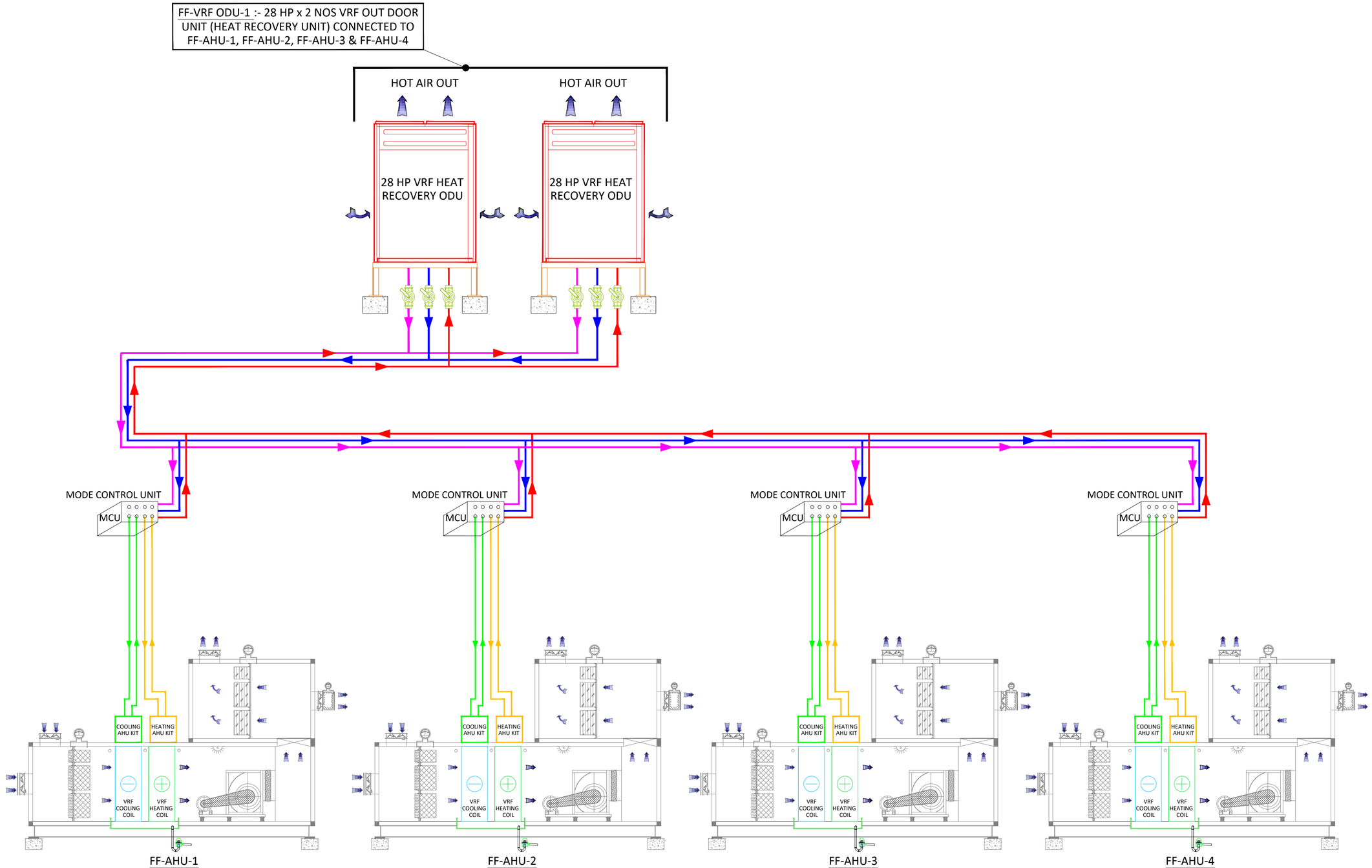
TYPICAL AIR HANDLING UNIT



PHILOSOPHY :-

1. The AHU cooling coil shall be controlled by AHU kit, based on input values from duct mounted temperature sensor inserted on the return air duct & remote set room temperature value.
2. The AHU heating coil shall be controlled by AHU kit, based on input values from duct mounted RH sensor to an dedicated PLC / DDC controller. AHU heating kit shall turn ON/OFF based on the command from this controller.
3. When the room RH is under control, then AHU heating kit shall be in OFF mode till these kits get a command from controller to turn ON & only cooling coil shall be in working mode.

LEGENDS:-	
	SUCTION LINE
	LIQUID LINE
	HIGH PRESSURE GAS LINE
	COOLING CIRCUIT
	HEATING CIRCUIT
	CONTROL CABLE
	SUPPLY AIR DUCT
	RETURN AIR DUCT



REVISIONS :

NO	DESCRIPTION	DATE	BY

TECHNICAL CONSULTANTS:

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LEAD CONSULTANT:

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B-1702, BRIGADE GATEWAY, 26/1, DR. RAJKUMAR ROAD,
MALLESWARAM WEST, BANGALORE.

CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University Campus, PUNE.

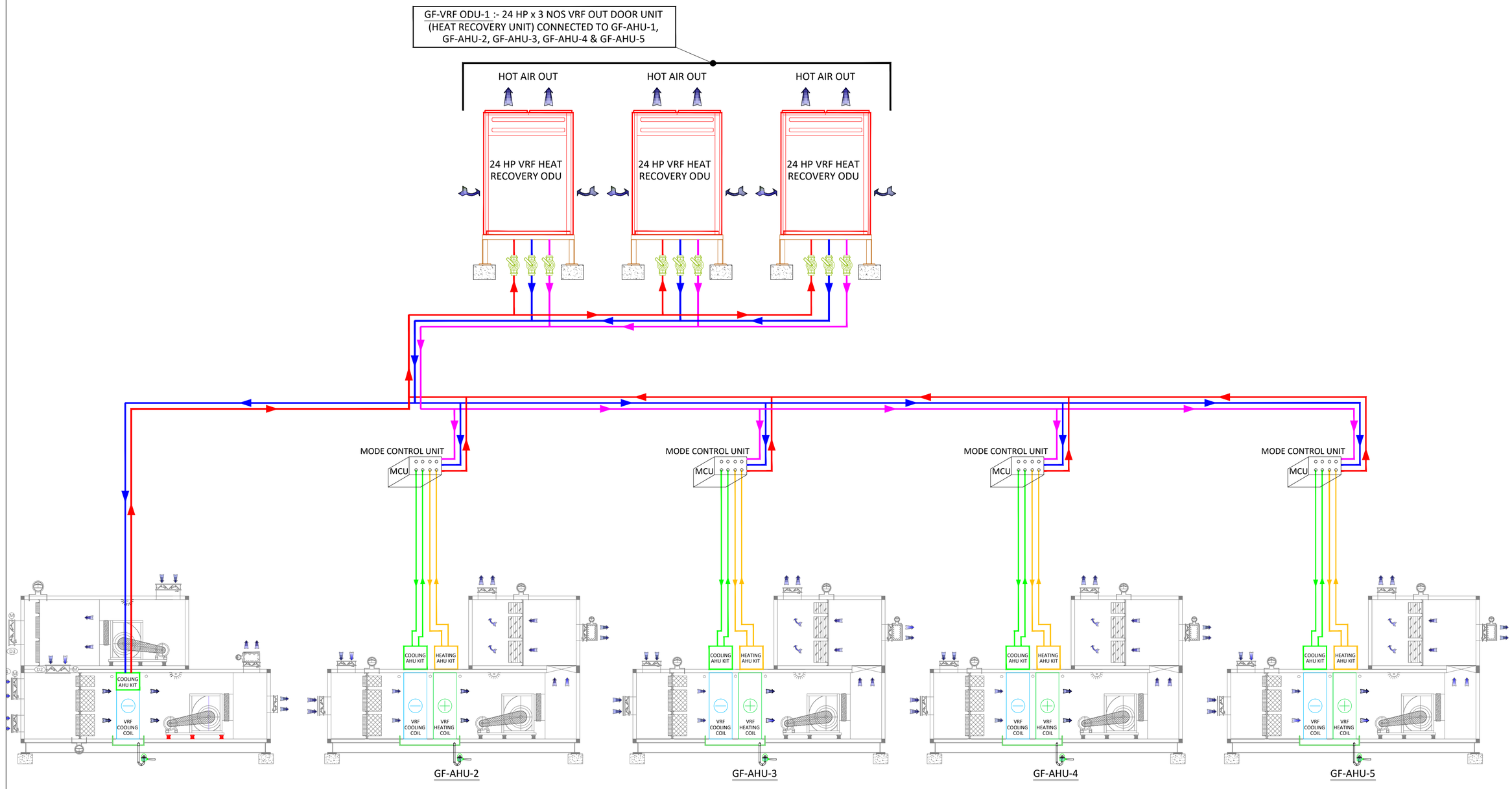
PROJECT :

ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

DRAWING TITLE:

VRF SCHEMATIC FOR FIRST FLOOR AHU'S

DATE	07.08.2023	
DRAWN	KM	
CHECKED	ARS	REVISION
APPROVED	DBS	
SCALE	NTS	PAGE - A3
DRAWING NO.	MJ 437 - HVAC - DR - 2641	



REVISIONS :

NO	DESCRIPTION	DATE	BY

TECHNICAL CONSULTANTS:

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LEAD CONSULTANT:

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MALLESWARAM WEST, BANGALORE.

CLIENT:

M/s. NATIONAL CENTRE FOR CELL SCIENCE
Savitribai Phule Pune University
Campus, PUNE.

PROJECT :

ESTABLISHMENT OF c-GMP COMPLIANT MAMMALIAN CELL LINE REPOSITORY AT NCCS, PUNE

DRAWING TITLE:

VRF SCHEMATIC FOR GROUND FLOOR AHU'S

DATE	07.08.2023	
DRAWN	KM	
CHECKED	ARS	REVISION
APPROVED	DBS	
SCALE	NTS	PAGE - A3
DRAWING NO.	MJ 437 - HVAC - DR - 2640	

FILTER EFFICIENCY EQUIVALENCE CHART

FREUDENBERG
INNOVATING TOGETHER

Rev :1 30th April 2019	FILTER GRADE EQUIVALENCE TABLE								FILTER EFFICIENCY VALUES AT PRESENT IN PHARMA MARKET IN INDIA	ISO 16890 BASIC REQUIREMENTS				
	PRE & FINE FILTERS					HEPA & ULPA FILTERS			STANDARD FRACTIONAL EFFICIENCIES (ALTERNATE ONLY IF CUSTOMER DEMANDS)	ISO 16890 MINIMUM EFFICIENCY REQUIREMENT %	ISO 16890 MANDATORY TO BE REPORTED			
	EUROVENT 4/5	EN 779	EN 779	ASHRAE 52.2	ISO 16890	EUROVENT 4/4	EN 1822	ISO 29463			PARTICULATE MATTER EFFICIENCY %			DUST HOLDING CAPACITY
	1979	1994	2012	(2007) MERV	2017		2011				ePM10	ePM2.5	ePM1	
COARSE	EU 1	G1	G1	1	ISO Coarse					< 50 % Initial Grav. Arrestance	YES	NO	NO	YES
	EU 2	G2	G2	2 to 4					65 % Down To 20 µ					
	EU 3	G3	G3	5 & 6					90 % Down To 20 µ					
	EU 4	G4	G4	7 to 8					90-95 % Down To 10 µ					
FINE	EU 5	F5	M5	9 to 10	ISO ePM10				90-95 % Down To 5 µ	≥ 50% @ 10 µ	YES	YES	YES	YES
	EU 6	F6	M6	11 to 12	ISO ePM2.5				85-90 % Down To 3 µ	≥ 50% @ 2.5 µ	YES	YES	YES	YES
	EU 7	F7	F7	13	ISO ePM1				95 % Down To 3 µ	≥ 50% @ 1 µ	YES	YES	YES	YES
	EU 8	F8	F8	14	ISO ePM1				80 % Down To 0.3µ (90% Down To 1µ)		YES	YES	YES	YES
	EU 9	F9	F9	15 to 16	ISO ePM1				85 % Down To 0.3µ (99% Down To 1µ)		YES	YES	YES	YES
EPA						EU 10	E10		95 % Down To 0.3 µ					
						EU 11	E11	ISO 15 E	99 % Down To 0.3 µ					
						-	-	ISO 20 E						
						EU 12	E 12	ISO 25 E	99.97 % Down To 0.3µ					
						-	-	ISO 30 E						
HEPA						EU 13	H13	ISO 35 H	99.997 % Down To 0.3µ (99.95% @ MPPS)					
						-	-	ISO 40 H						
						EU 14	H14	ISO 45 H	99.999 % Down To 0.3µ (99.995% @ MPPS)					
						-	-	ISO 50 U						
ULPA							U15	ISO 55 U	99.9995 % @ MPPS					
							-	ISO 60 U						
							U16	ISO 65 U	99.99995 % @ MPPS					
							-	ISO 70 U						
							U17	ISO 75 U	99.999995 % @ MPPS					

Notes :

1] These comparisons of filter rating systems are only approximate as the test methods are different.
2] Freudenberg reserves right to change any parameters mentioned in this sheet.
3] Specific approval required if any other efficiencies to be confirmed by Freudenberg.
4] Products under Pyramid brand only to be considered.
5] ISO 16890 certified and tested products are available under Viledon brand