

SEQUENCE OF OPERATION GUIDELINE

LABORATORY CONTROL – SUPPLY, GENERAL AND FUME

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NOTES:

1. THIS SEQUENCE IS INTENDED TO PROVIDE THE DESIGN PROFESSIONAL WITH A BASIC GUIDELINE OF MINIMUM REQUIREMENTS FOR A TYPICAL LABORATORY WITH SUPPLY TERMINAL, GENERAL EXHAUST TERMINAL AND FUME EXHAUST TERMINAL. THIS SEQUENCE SHALL BE CAREFULLY REVIEWED AND EDITED WITH RESPECT TO APPLICATION-SPECIFIC PROJECT REQUIREMENTS AND PROPOSED MODIFICATIONS SHALL BE REVIEWED WITH FSU STAFF.
2. THE INTENT IS FOR THIS SEQUENCE TO BE INCLUDED IN THE CONTRACT DRAWINGS.
3. USE ZONE OCCUPANCY SENSORS FOR “UNOCCUPIED” MODE WHENEVER POSSIBLE. COORDINATE WITH ELECTRICAL/LIGHTING DESIGN FOR DUAL USE.
4. REFERENCE STANDARD CONTROL DIAGRAMS IC-14.

LABORATORY, SUPPLY, GENERAL EXHAUST AND FUME EXHAUST:

PROVIDE THE FOLLOWING FOR ALL LABORATORIES.

1. ROOM THERMOSTAT WITH INTEGRAL TEMPERATURE SENSOR, INTEGRAL DISPLAY, SLIDING SCALE SETPOINT ADJUSTMENT, AND REMOTE COMMUNICATION PORT.
2. THE LABORATORY ENVELOPE CONSISTS OF 1 FUME HOOD WITH INDIVIDUAL VAV FACE VELOCITY CONTROLLER, 1 SUPPLY VAV BOX WITH REHEAT COIL AND 1 GENERAL EXHAUST VAV BOX.
3. PROVIDE A SUPPLY AIR SENSOR DOWNSTREAM OF THE SUPPLY TERMINAL REHEAT COIL FOR USE IN MONITORING OVERALL TERMINAL UNIT PERFORMANCE.
4. CALCULATE TOTAL EXHAUST AIR VOLUME AND TOTAL SUPPLY AIR VOLUME FOR THE LAB TO MONITOR AND MAINTAIN A SCHEDULED AIRFLOW OFFSET
5. OCCUPIED MODE SHALL BE DETERMINED BY [SCHEDULE OR LOCAL OCCUPANCY SENSOR].

OCCUPIED MODE

1. THE LAB CONTROLLER SHALL MAINTAIN OCCUPIED TEMPERATURE SETPOINTS AND MINIMUM VENTILATION RATES. REFER TO SCHEDULE FOR MINIMUM OCCUPIED CFM SETPOINTS TO ESTABLISH MINIMUM VENTILATION RATES DURING OCCUPIED MODE.

UNOCCUPIED MODE

1. THE LAB CONTROLLER SHALL MAINTAIN UNOCCUPIED TEMPERATURE SETPOINTS AND MINIMUM VENTILATION RATES. REFER TO SCHEDULE FOR MINIMUM UNOCCUPIED CFM SETPOINTS TO ESTABLISH MINIMUM VENTILATION RATES DURING UNOCCUPIED MODE.

FUME HOOD CONTROL

1. THE FUME HOOD CONTROLLER SHALL CALCULATE THE TOTAL FUME HOOD OPEN AREA BASED ON THE FUME HOOD'S FIXED OPENINGS, BYPASS OPENING, LEAKAGE AREA AND SASH POSITION AS INDICATED BY THE SASH SENSOR(S).
2. THE FUME HOOD CONTROLLER SHALL CONTINUOUSLY CALCULATE THE FUME HOOD EXHAUST CFM REQUIRED TO MAINTAIN THE AVERAGE FACE VELOCITY SET POINT BASED ON THE TOTAL OPEN AREA OF THE FUME HOOD AND THE AVERAGE FACE VELOCITY SET POINT.
3. THE FUME HOOD CONTROLLER SHALL UTILIZE A FUME HOOD EXHAUST TERMINAL TO MEASURE ACTUAL FUME HOOD EXHAUST CFM AND MODULATE THE FUME HOOD EXHAUST TO CONTROL AND MAINTAIN THE REQUIRED FUME HOOD AVERAGE FACE VELOCITY.
4. THE FUME HOOD CONTROLLER SHALL MAINTAIN THE FUME HOOD EXHAUST CFM AT THE SCHEDULED MINIMUM SET POINT WHEN THE SASH IS AT ITS MINIMUM POSITION.

ROOM VENTILATION CONTROL

1. THE LAB CONTROLLER SHALL RECEIVE THE FUME HOOD EXHAUST CFM SET POINT VALUE FROM EACH FUME HOOD CONTROLLER IN THE ROOM AND MEASURES THE ACTUAL ROOM GENERAL EXHAUST CFM.
2. THE LAB CONTROLLER CALCULATES TOTAL ROOM EXHAUST CFM BY ADDING THE ROOM GENERAL EXHAUST CFM AND ALL FUME HOOD EXHAUST SET POINTS TOGETHER.
3. THE LAB CONTROLLER SHALL THEN MODULATE THE ROOM GENERAL EXHAUST FROM ITS SCHEDULED MINIMUM TO MAXIMUM FLOW SETPOINT TO ENSURE THAT A MINIMUM TOTAL ROOM EXHAUST NECESSARY TO MEET THE REQUIRED ROOM VENTILATION RATE IS CONTINUOUSLY MAINTAINED.

ROOM PRESSURIZATION CONTROL

1. THE LAB CONTROLLER SHALL UTILIZE AN AIRFLOW SENSOR IN THE ROOM SUPPLY AIR TERMINAL TO CONTINUOUSLY MEASURE THE ACTUAL ROOM SUPPLY AIR CFM.
2. THE LAB CONTROLLER CALCULATES THE REQUIRED ROOM SUPPLY AIR CFM NECESSARY TO MAINTAIN THE PREDETERMINED FLOW TRACKING DIFFERENTIAL BY SUBTRACTING THE FLOW TRACKING DIFFERENTIAL CFM SET POINT FROM THE TOTAL ROOM EXHAUST CFM.
3. THE LAB CONTROLLER SHALL MODULATE THE ROOM SUPPLY AIR CFM TO ENSURE THAT THE FLOW TRACKING DIFFERENTIAL CFM IS ALWAYS MAINTAINED.

ROOM TEMPERATURE CONTROL

1. WHEN THE ROOM AIRFLOWS ARE NOT CHANGING, THE LAB CONTROLLER MAINTAINS THE ROOM AT THE AMBIENT TEMPERATURE SET POINT BY MODULATING THE HEATING VALVE.
2. THE LAB CONTROLLER SHALL CONTINUOUSLY CALCULATE THE ROOM COOLING LOAD AS A FUNCTION OF THE SUPPLY AIRFLOW AND THE TEMPERATURE DIFFERENCE BETWEEN THE ROOM TEMPERATURE SENSOR AND THE SUPPLY AIRTEMPERATURE SENSOR.
3. UPON A CHANGE IN ROOM AIRFLOW (I.E. FUME HOOD SASH IS REPOSITIONED), THE LAB CONTROLLER SHALL CALCULATE THE NEW REQUIRED SUPPLY AIR TEMPERATURE REQUIRED TO HANDLE THE SAME ROOM COOLING LOAD BUT AT THE NEW SUPPLY AIRFLOW NEEDED TO MAINTAIN ROOM PRESSURIZATION.
4. IF THE CALCULATED SUPPLY AIR TEMPERATURE IS OUTSIDE OF THE PRESET SUPPLY AIR TEMPERATURE DISCHARGE LIMITS, THE SEQUENCE MAINTAINS THE SUPPLY DISCHARGE TEMPERATURE AT THE LIMIT AND INCREASES THE SUPPLY AIRFLOW TO HANDLE THE COOLING LOAD WHILE ALSO INCREASING THE ROOM GENERAL EXHAUST AIRFLOW TO MAINTAIN ROOM PRESSURIZATION.

OCCUPIED SETPOINT 74 F (ADJUSTABLE)

UNOCCUPIED SETPOINT 78 F (ADJUSTABLE)

LAB TYPE: IC-14 LABORATORY - SUPPLY / FUME / EXHAUST / TRACKING		POINT TYPE		ALARM CONDITION			INTEGRATED POINT	NOTES
SHORT NAME	POINT DESCRIPTION	UNITS	ANALOG	DIGITAL	EQUIP ALARM	HIGH LIMIT		
bbb_LAB_RMxxx_SUP_FLW	SUPPLY AIR FLOW	CFM	X			X	X	
bbb_LAB_RMxxx_SUP_DMP	SUPPLY AIR DAMPER	%OPEN	X					
bbb_LAB_RMxxx_SUP_RHV	REHEAT VALVE OUTPUT	%OPEN	X					
bbb_LAB_RMxxx_SUP_SA	SUPPLY AIR TEMPERATURE	DEG F	X			X	X	
bbb_LAB_RMxxx_SUP_OS	OCCUPANCY STATUS	OCC/UNOCC		X				
bbb_LAB_RMxxx_GEX_FLW	GENERAL EXHAUST AIR FLOW	CFM	X			X	X	
bbb_LAB_RMxxx_GEX_DMP	EXHAUST AIR DAMPER	%OPEN	X					
bbb_LAB_RMxxx_FEX_FLW	FUME HOOD EXHAUST AIR FLOW	CFM	X			X	X	
bbb_LAB_RMxxx_FEX_DMP	FUME HOOD EXHAUST AIR DAMPER	%OPEN	X					
bbb_LAB_RMxxx_FH_OCC	FUME HOOD ZONE PRESENCE SENSOR	OCC/UNOCC		X				
bbb_LAB_RMxxx_FH_SASH	FUME HOOD SASH POSITION SENSOR	%	X					
bbb_LAB_RMxxx_ZT	LAB TEMPERATURE	DEG F	X			X	X	
bbb_LAB_RMxxx_SP	LAB TEMPERATURE SETPOINT	DEG F	X					
bbb_LAB_RMxxx_OR	LAB TEMPORARY OCCUPANCY OVERRIDE	OCC/UNOCC		X				
bbb_LAB_RMxxx_H	LAB HUMIDITY	%RH	X					
bbb_LAB_RMxxx_DP	LAB DIFFERENTIAL PRESSURE	INWC	X			X	X	