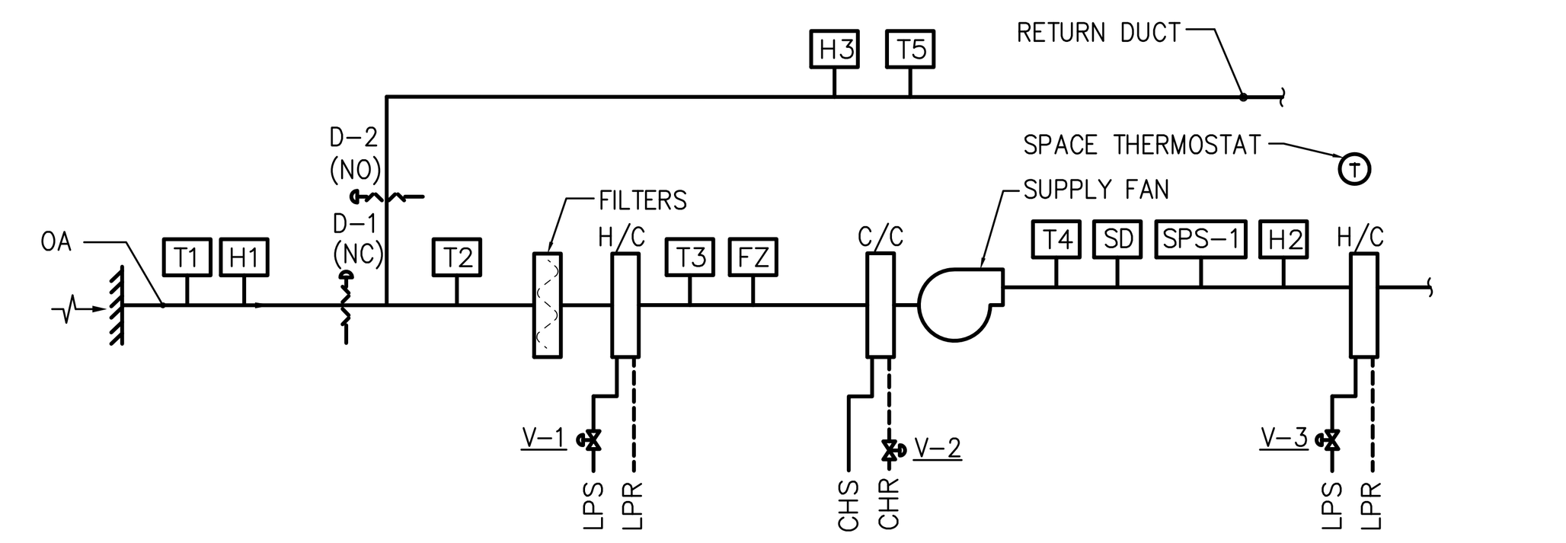


AIR HANDLING UNIT CONTROL 69-AC1

1. GENERAL

1.1. SUPPLY FAN SHALL OPERATE CONTINUOUSLY IN THE OCCUPIED MODE, H-O-A SWITCH SHALL BE KEPT IN "AUTO" POSITION, D-1 SHALL BE FULLY OPEN AND D-2 SHALL BE FULLY CLOSED. WHEN SUPPLY FAN IS DE-ENERGIZED, D-1 SHALL BE FULLY CLOSED.

1.2. OCCUPIED-UNOCCUPIED MODE SHALL BE AS DETERMINED BY THE ENERGY MANAGEMENT SYSTEM.

1.3. PROVIDE SEPARATE, INDEPENDENT LINKAGE CONTROL FOR EACH M.O.D. (D-1 & D-2)

2. TEMPERATURE CONTROLS

2.1. OCCUPIED:

A. THE SUPPLY AIR TEMPERATURE, SENSED BY T4, SHALL THEN BE MAINTAINED AT SETPOINT BY MODULATING V-1 OR V-2 AS REQUIRED. THE SUPPLY AIR TEMPERATURE SETPOINT SHALL BE AS PER THE FOLLOWING SUPPLY AIR RESET SCHEDULE (ALL TEMPERATURES SHALL BE ADJUSTABLE):

SUPPLY AIR RESET SCHEDULE	
OA TEMP (°F)	SUPPLY AIR TEMP (°F)
55 OR BELOW	55
56 - 60	55
61 - 70	55
71 - 80	55
81 OR ABOVE	55

SPACE THERMOSTAT SHALL MODULATE REHEAT CONTROL VALVE, V-3, TO MAINTAIN SPACE TEMPERATURE SETPOINT (ADJUSTABLE).

2.2. UNOCCUPIED: THE UNIT SHALL BE DISABLED DURING UNOCCUPIED HOURS IN LIEU OF CYCLING TO MEET A SETBACK TEMPERATURE. PROVIDE MANUAL UNOCCUPIED TO OCCUPIED OVERRIDE SWITCH.

2.3. MORNING WARM-UP: WHEN SYSTEM IS FIRST INDEXED TO OCCUPIED, DAMPERS D-1 SHALL REMAIN CLOSED, D-2 SHALL REMAIN OPEN AND FAN SHALL OPERATE WITH HEATING VALVE OPEN UNTIL RETURN AIR, AS SENSED BY T5, REACHES 65°F (ADJUSTABLE). AT THIS TIME, SYSTEM SHALL RETURN TO THE OCCUPIED MODE, SEE 2.1.

3. FREEZE PROTECTION

3.1. WHEN THE AIR TEMPERATURE AS SENSED BY T3 FALLS BELOW 40°F, AN ALARM SIGNAL SHALL BE INDICATED AT THE ECC. IF THIS TEMPERATURE FALLS BELOW 36°F, THE UNIT SUPPLY FAN SHALL DE-ENERGIZE AND A CRITICAL ALARM SHALL BE INDICATED AT THE ENERGY MANAGEMENT SYSTEM AND D-1 SHALL CLOSE.

4. MISCELLANEOUS

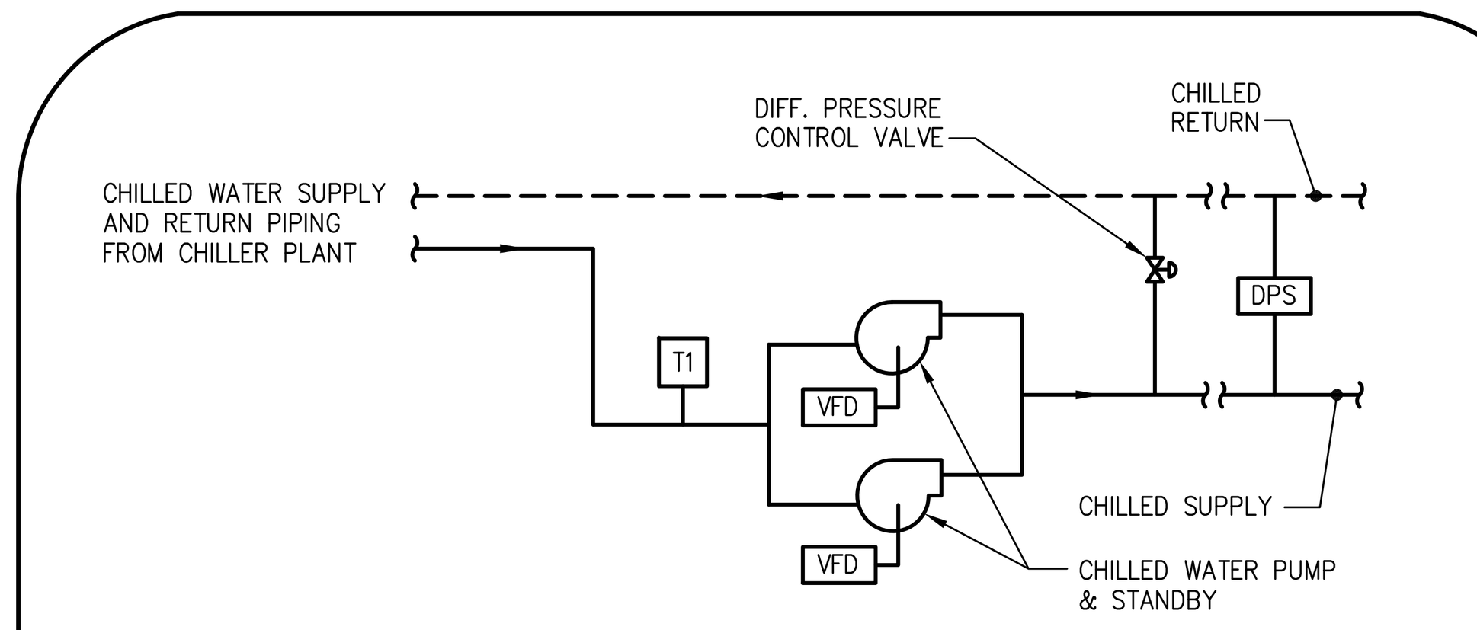
4.1 SMOKE DETECTOR, SD, LOCATED IN THE SUPPLY AIR SHALL DE-ENERGIZE SUPPLY FAN FOR BOTH AIR HANDLING UNITS SHOULD PRODUCTS OF COMBUSTION BE SENSED AT EITHER SMOKE DETECTOR. EXHAUST FAN SHALL CONTINUE TO RUN. SMOKE DETECTOR, SD, SHALL INITIATE A SUPERVISORY SIGNAL UPON DETECTION OF SMOKE AND ALARM AT THE ENERGY MANAGEMENT SYSTEM.

4.2. HIGH LIMIT STATIC PRESSURE SENSOR, SPS-1. SHALL DE-ENERGIZE FANS WHEN STATIC PRESSURE REACHES 3.0" (ADJUSTABLE). ALARM AT THE ENERGY MANAGEMENT SYSTEM.

4.3. THE ENERGY MANAGEMENT SYSTEM SHALL MONITOR FILTER LOADING ACROSS EACH FILTER BANK. ALARM AT THE ENERGY MANAGEMENT SYSTEM

EXISTING VENTILATION AIR HANDLING UNIT CONTROL SEQUENCE

CONFIRM EXISTING AIR HANDLING UNIT CONTROLS ARE FUNCTIONING ACCORDING TO THE ORIGINAL CONTROL SEQUENCES AS DETAILED ABOVE. MAKE MODIFICATIONS TO UNIT CONTROLS AS REQUIRED TO ACHIEVE THE ORIGINAL DESIGN INTENT.

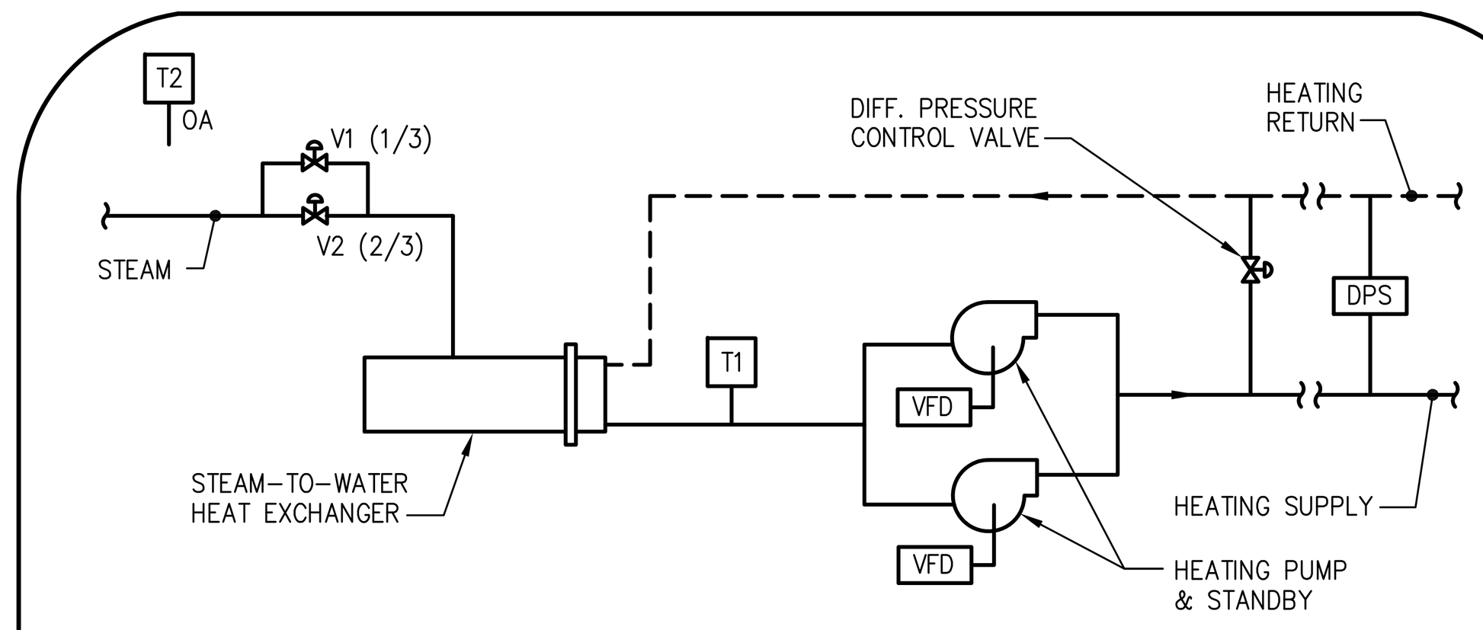


CHILLED WATER CONTROL SEQUENCE

1. LEAD CIRCULATOR PUMP SHALL RUN CONTINUOUSLY. LAG PUMP SHALL START AUTOMATICALLY WHEN LOSS OF FLOW IS SENSED BY CURRENT SENSING RELAYS AT EACH PUMP. PROVIDE ALTERNATOR TO CONTROL LEAD/LAG PUMP OPERATION. LEAD PUMP SHALL BE ALTERNATED EVERY 300 HOURS (ADJUSTABLE) OF RUN TIME.
2. DIFFERENTIAL PRESSURE SENSOR (DPS) SHALL CONTROL VFD'S TO MAINTAIN SYSTEM DIFFERENTIAL PRESSURE SETPOINT. DIFFERENTIAL PRESSURE SETPOINT TO BE FIELD DETERMINED BY THE ATC CONTRACTOR AND ADJUSTABLE AT OPERATOR'S WORK STATION. SHOULD VFD'S REACH MINIMUM TURNDOWN, DPS SHALL MODULATE DIFFERENTIAL PRESSURE VALVE TO MAINTAIN DIFFERENTIAL PRESSURE SETPOINT. CONTRACTOR SHALL LOCATE DPS IN FIELD AND INDICATE ON AS-BUILT/ RECORD DRAWINGS.

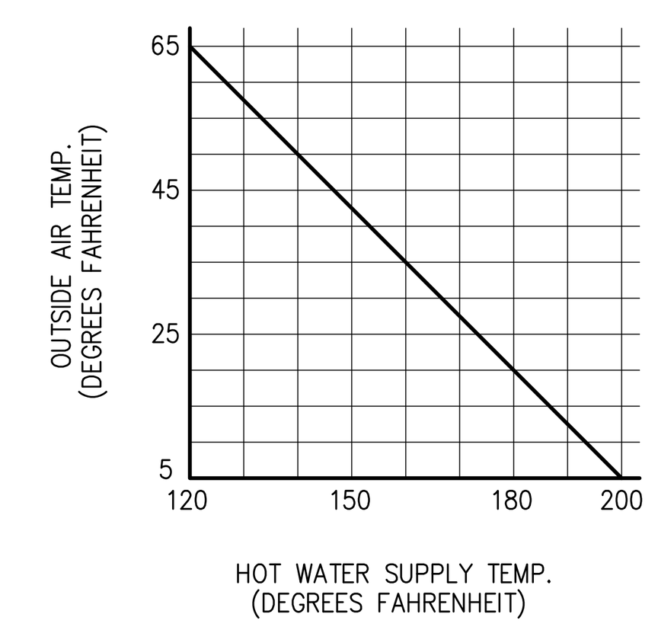
IT ROOM FAN COIL UNIT AND EXISTING SPLIT-SYSTEM CONTROL SEQUENCE

1. FAN COIL UNIT SHALL OPERATE IN THE OCCUPIED MODE AS DESCRIBED IN THE FOUR PIPE FAN COIL UNIT CONTROL SEQUENCE AT ALL TIMES.
2. EXISTING SPLIT-SYSTEM SHALL HAVE A COOLING SETPOINT OF 78° F.
3. A RELAY SHALL DISABLE THE EXISTING SPLIT-SYSTEM WHEN THE SPACE TEMPERATURE SENSOR ASSOCIATED WITH ROOM FAN COIL UNIT CALLS FOR HEAT. EXACT MEANS OF TIE-IN TO THE EXISTING SPLIT-SYSTEM CONTROL CIRCUIT OR POWER SUPPLY SHALL BE ADDRESSED BY THE CONTROLS CONTRACTOR DURING CONSTRUCTION.

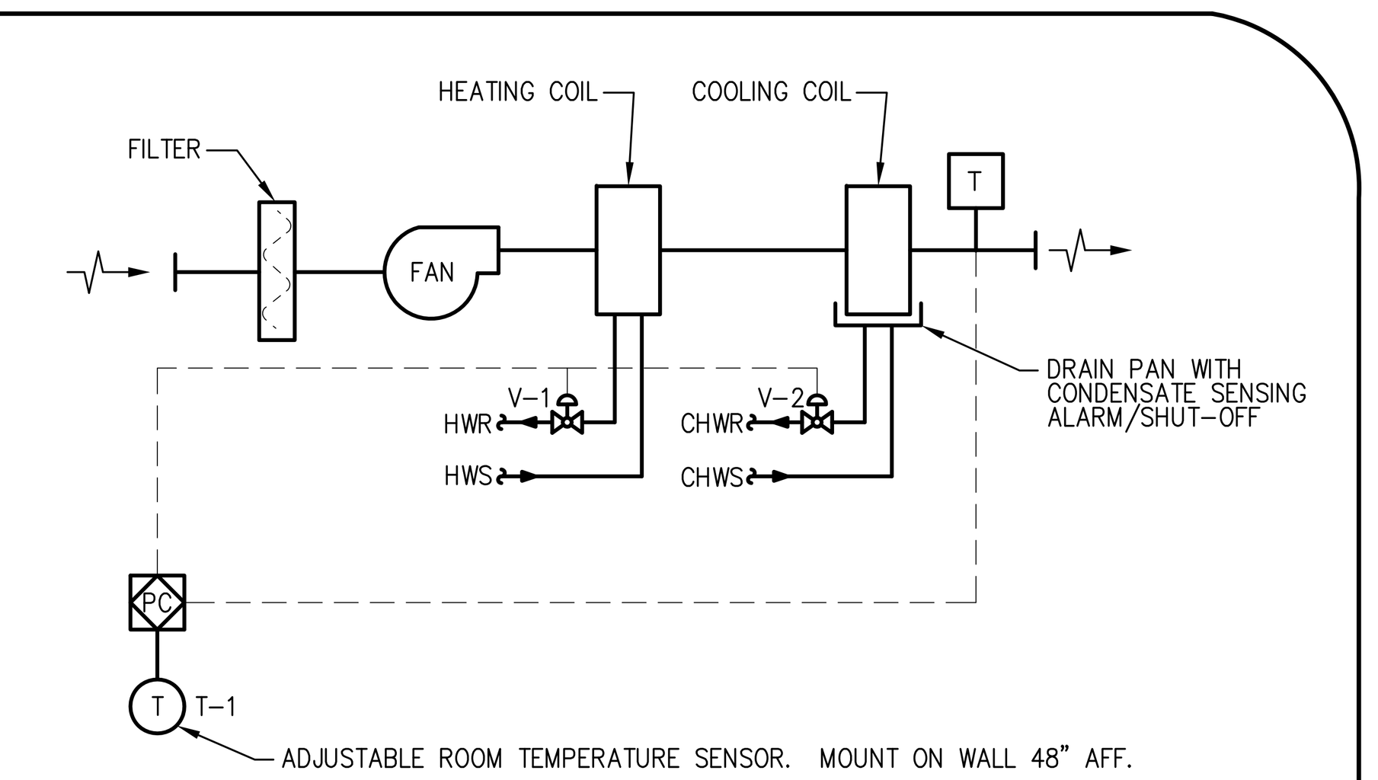


HEATING WATER CONTROL SEQUENCE

1. STEAM CONTROL VALVES V-1 AND V-2 SHALL REMAIN CLOSED WHEN CIRCULATOR PUMPS ARE DE-ENERGIZED.
2. LEAD CIRCULATOR PUMP SHALL RUN CONTINUOUSLY. LAG PUMP SHALL START AUTOMATICALLY WHEN LOSS OF FLOW IS SENSED BY CURRENT SENSING RELAYS AT EACH PUMP. PROVIDE ALTERNATOR TO CONTROL LEAD/LAG PUMP OPERATION. LEAD PUMP SHALL BE ALTERNATED EVERY 300 HOURS (ADJUSTABLE) OF RUN TIME.
3. T1 SHALL MODULATE V-1 AND V-2 TO MAINTAIN SETPOINT OF 180°F (ADJUSTABLE).
4. DIFFERENTIAL PRESSURE SENSOR (DPS) SHALL CONTROL VFD'S TO MAINTAIN SYSTEM DIFFERENTIAL PRESSURE SETPOINT. DIFFERENTIAL PRESSURE SETPOINT TO BE FIELD DETERMINED BY THE ATC CONTRACTOR AND ADJUSTABLE AT OPERATOR'S WORK STATION. SHOULD VFD'S REACH MINIMUM TURNDOWN, DPS SHALL MODULATE DIFFERENTIAL PRESSURE VALVE TO MAINTAIN DIFFERENTIAL PRESSURE SETPOINT. CONTRACTOR SHALL LOCATE DPS IN FIELD AND INDICATE ON AS-BUILT/ RECORD DRAWINGS.



NOTE:
THE TEMPERATURE RESET SCHEDULE SHALL BE CAPABLE OF BEING ADJUSTED THROUGHOUT THE COMPLETE SPAN OF THE SENSORS.



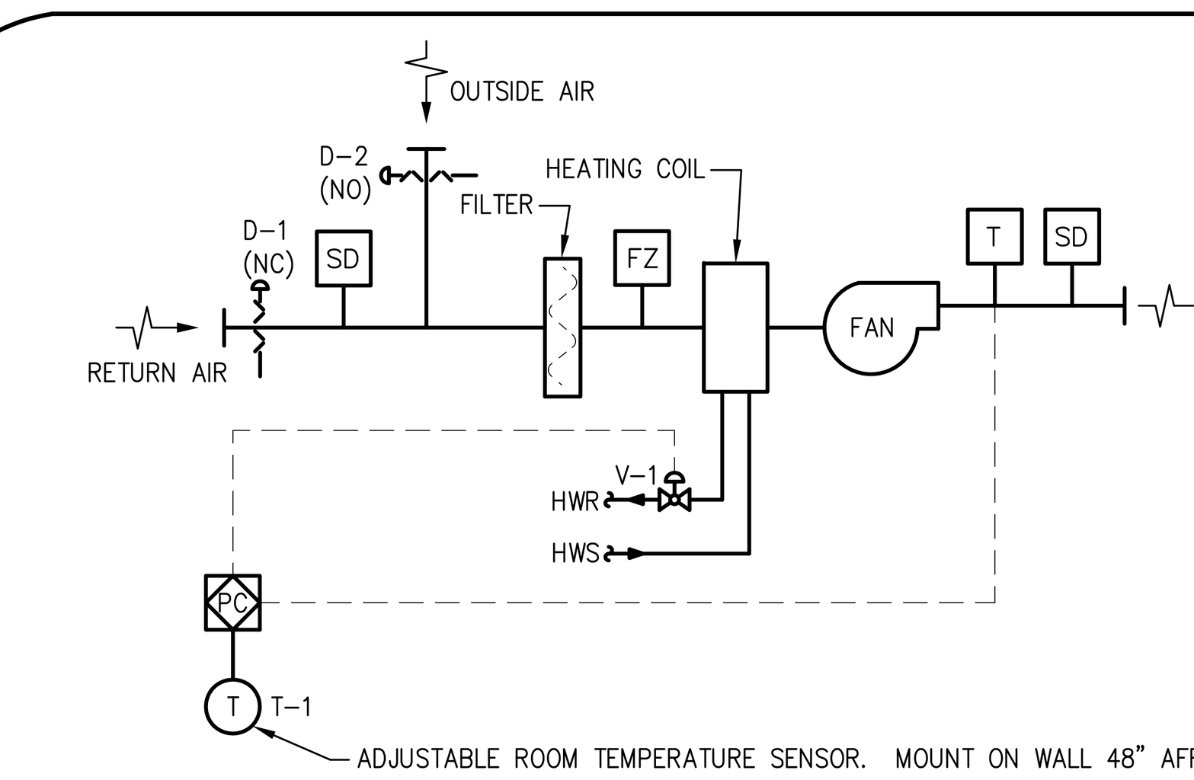
FOUR PIPE FAN COIL UNIT CONTROL SEQUENCE

FAN COIL SEQUENCE OF OPERATION

1. OCCUPIED: FAN COIL SHALL OPERATE ON A SCHEDULE AS SET BY EMCS. FAN SHALL RUN CONTINUOUSLY IN OCCUPIED MODE. FAN STATUS SHALL BE MONITORED, AND IN THE EVENT THE UNIT FAILS TO RUN BETWEEN THE RANGE OF 70°-75° SPACE TEMPERATURE, AN ALARM MESSAGE SHALL BE GENERATED AND BOTH V-1 & V-2 SHALL BE CLOSED. UPON RISE IN TEMPERATURE ABOVE 75°, V-2 SHALL MODULATE OPEN TO MAINTAIN 75° F. UPON FALL IN TEMPERATURE BELOW 70° F, HEATING VALVE V-1 SHALL MODULATE TO OPEN TO MAINTAIN 70° F.
2. UNOCCUPIED (HEATING): NIGHT THERMOSTAT SHALL CYCLE FAN AND OPEN HEATING VALVE, V-1, TO MAINTAIN NIGHT SETBACK TEMPERATURE OF 60°F (ADJUSTABLE).
3. UNOCCUPIED (COOLING): NIGHT THERMOSTAT SHALL CYCLE FAN AND OPEN COOLING VALVE, V-2, TO MAINTAIN NIGHT SETBACK TEMPERATURE OF 85°F (ADJUSTABLE).
4. DRAIN PAN CONDENSATE SWITCH SHALL DE-ENERGIZE FAN COIL UNIT AND SEND AN ALARM WHEN SENSING WATER ACCUMULATION.

ATC GENERAL NOTES

1. THE ATC CONTRACTOR SHALL FURNISH AND INSTALL ALL ELECTRICAL WIRING AND CONDUIT FROM POWER SOURCE, INCLUDING TERMINATION TO ALL REQUIRED ATC RELATED POWER CONNECTIONS INCLUDING, BUT NOT LIMITED TO, DDC CONTROLLERS (PROVIDE LOW VOLTAGE CONTROLLER FOR AIR TERMINAL UNITS INCLUDING TRANSFORMERS AND DISCONNECT SWITCHES AS REQUIRED), SENSORS, VALVE AND DAMPER ACTUATORS (INCLUDING SMOKE DAMPERS), ATC PANELS, ETC. THE ATC CONTRACTOR SHALL OBTAIN A SEPARATE ELECTRICAL PERMIT AS REQUIRED BY THE LOCAL AUTHORITY. THE ATC CONTRACTOR SHALL BE WHOLLY RESPONSIBLE FOR ALL POWER REQUIREMENTS NECESSARY FOR A COMPLETE INSTALLATION FROM THE POWER SOURCE TO ALL ATC RELATED CONNECTIONS.
2. WATER PRESSURE DROP THROUGH ATC CONTROL VALVES SHALL NOT EXCEED 10 FT. HEAD. TWO-POSITION ATC VALVES UTILIZED FOR ISOLATION, BY-PASS OR SHUT-OFF PURPOSES SHALL BE FULL LINE SIZE.
3. EACH AIR DISTRIBUTION SYSTEM SHALL BE PROVIDED WITH NOT LESS THAN ONE (1) MANUALLY OPERABLE MEANS TO STOP THE OPERATION OF THE SUPPLY FAN IN AN EMERGENCY. THE MEANS OF MANUAL OPERATION SHALL BE LOCATED AT A LOCATION APPROVED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ). TYPICALLY, PROVIDE A MANUAL FIRE DEPARTMENT HVAC SHUTDOWN VIA A KNOX KEY SWITCH FOR ALL SUPPLY FANS AS REQUIRED BY THE LOCAL AHJ. SWITCH SHALL BE LOCATED ADJACENT TO THE FIRE ALARM ANNUNCIATOR PANEL AND SHUTDOWN CONTROL SHALL BE HARD-WIRED IN CONDUIT THROUGH THE ATC SYSTEM. ALL WORK SHALL COMPLY WITH NFPA 90A AND THE NATIONAL ELECTRICAL CODE. COORDINATE EXACT REQUIREMENTS WITH AHJ.
4. THE ATC CONTRACTOR SHALL PROVIDE ALL POINTS REQUIRED TO ACCOMPLISH THE CONTROL SEQUENCES INDICATED ON THE DRAWINGS AND IN THE SPECIFICATIONS. ALL POINTS SHALL BE TIED INTO THE ENERGY MANAGEMENT SYSTEM. IN ADDITION, THE ATC CONTRACTOR SHALL PROVIDE ALL POINTS REQUIRED TO CONTROL, OPERATE AND MONITOR ALL EQUIPMENT AND DEVICES (IE. HEAT EXCHANGER, PUMPS, FANS COIL UNITS, VALVES, DAMPERS, FLOW MEASURING DEVICES, SENSORS, ETC.) INDICATED THROUGHOUT THE CONTRACT DOCUMENTS.
5. PROVIDE EQUIPMENT STATUS FOR ALL MECHANICAL EQUIPMENT. EQUIPMENT FAILURES SHALL BE ALARMED AT THE ENERGY MANAGEMENT SYSTEM. PROVIDE END SWITCHES FOR ALL MOTOR OPERATED DAMPERS. END SWITCHES SHALL BE INTERFACED WITH THE ENERGY MANAGEMENT SYSTEM.
6. PROVIDE TEMPERATURE SENSORS TIED INTO THE ENERGY MANAGEMENT SYSTEM AT THE INLET AND OUTLET OF ALL HEAT EXCHANGE EQUIPMENT (HEAT EXCHANGER, ETC.)
7. CONTRACTOR SHALL PROVIDE CONTROLS WITH SINGLE POINT WEB-BASED ACCESS FOR ALL HVAC EQUIPMENT IN BUILDING 69, INCLUDING THE EXISTING AIR HANDLING UNIT (69-AC1).
8. ALL CONTROL WORK WITHIN THE CHILLER PLANT SHALL BE PROVIDED BY TRANE AND TIED INTO THE EXISTING TRANE CONTROL SYSTEM.



CORRIDOR HEATING AND VENTILATING UNIT CONTROL SEQUENCE

H/V UNIT SEQUENCE OF OPERATION
H/V UNIT SHALL OPERATE ON A SCHEDULE AS SET BY EMCS.

SUMMER:
OCCUPIED: FAN SHALL RUN CONTINUOUSLY. HEATING COIL VALVE V-1 SHALL BE CLOSED, RETURN AIR DAMPER D-1 SHALL BE CLOSED, AND OUTSIDE AIR DAMPER D-2 SHALL BE OPEN.

NIGHT SETBACK: FAN SHALL BE SHUT DOWN, RETURN AIR DAMPER D-1 SHALL BE OPEN, AND OUTSIDE AIR DAMPER D-2 SHALL BE CLOSED.

WINTER:
MORNING WARM-UP: FAN SHALL RUN CONTINUOUSLY. FOR MORNING WARM-UP, HEATING COIL VALVE V-1 SHALL BE OPEN, RETURN AIR DAMPER D-1 SHALL BE OPEN, AND OUTSIDE AIR DAMPER D-2 SHALL BE CLOSED. ON A RISE IN SPACE TEMPERATURE ABOVE SETPOINT OF 70°F (ADJUSTABLE), RETURN AIR DAMPER D-1 SHALL CLOSE AND OUTSIDE AIR DAMPER D-2 SHALL OPEN.

OCCUPIED: FAN SHALL RUN CONTINUOUSLY. HEATING COIL VALVE V-1 SHALL BE CLOSED, RETURN AIR DAMPER D-1 SHALL BE CLOSED AND OUTSIDE AIR DAMPER D-2 SHALL BE OPEN. HEATING COIL VALVE V-1 SHALL MODULATE TO MAINTAIN SPACE SETPOINT OF 70°F (ADJUSTABLE).

NIGHT SETBACK: FAN SHALL BE SHUT DOWN, RETURN AIR DAMPER D-1 SHALL BE OPEN, AND OUTSIDE AIR DAMPER D-2 SHALL BE CLOSED. HEATING COIL VALVE V-1 SHALL BE IN FULLY OPEN POSITION. ON A CALL FOR HEAT, FAN SHALL CYCLE ON TO SATISFY SPACE TEMPERATURE SENSOR.

Revisions | Date

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Drawing Title	Project Title	Date
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Approved: Facilities Engineering Service Chief	Building Number: 69 / Checked: MAF / Drawn: ERS	Project No. 542-09-102
Approved: Medical Center Director	Location: COATESVILLE, PENNSYLVANIA	Drawing No. 69-H11, Dwg. 16 of 22

DEPARTMENT OF VETERANS AFFAIRS

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