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Signed on 03/31/2023

using a Digital Signature.

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**SHEET NAME: MECHANICAL** 

**ORIG SUBMISSION:** 2023.04.03 **CURRENT:** 

M-001

**ABBREVIATIONS** 

ABV ABOVE ACCESS DOOR

ABOVE FINISHED FLOOR ABOVE RAISED FLOOR

ABOVE FINISHED GRADE AIRFLOW MEASURING SYSTEM AP ACCESS PANEL

APR AIR PRESSURE APD AIR PRESSURE DROP ARCH ARCHITECT/ARCHITECTURAL

BEL BELOW BF BELOW FLOOR

BM BEAM BOD BOTTOM OF DUCT BCS BUILDING CONTROL SYSTEM

CFM CUBIC FEET PER MINUTE CLG CEILING COL COLUMN

CONN CONNECT/CONNECTION CONT CONTINUATION/CONTINUOUS

CTE CONNECT TO EXISTING DB DRY BULB

DN DOWN DWG DRAWING EA EXHAUST AIR

EAT ENTERING AIR TEMPERATURE ELEC ELECTRICAL/ELECTRIC

EX EXISTING EXP EXPOSED FC FLEXIBLE CONNECTION

FL FLOOR FPM FEET PER MINUTE FPS FEET PER SECOND

GPM GALLONS PER MINUTE GR GRADE LAT LEAVING AIR TEMPERATURE

NC NORMALLY CLOSED NO NORMALLY OPEN

OA OUTSIDE AIR OBD OPPOSED-BLADE DAMPER

OC ON CENTER RA RETURN AIR REL RELOCATE

REM REMOVE SA SOUND ATTENUATOR SPEC SPECIFICATION

TEMP TEMPERATURE TS TIGHT TO STRUCTURE

TYP TYPICAL UG UNDERGROUND VFD VARIABLE FREQUENCY DRIVE

WB WET BULB

WG WATER GAUGE WPD WATER PRESSURE DROP **DUCTWORK AND AIR DISTRIBUTION** 

DUCT (FIRST DIMENSION IS SIDE SHOWN IN INCHES) DUCT LINING (1" THICK UNLESS 2" NOTED) SUPPLY AIR DUCT SECTION

RETURN OR OUTSIDE AIR DUCT SECTION EXHAUST AIR DUCT SECTION

TRANSITION PRESS-ON COLLAR FITTING WITH ROUND FLEXIBLE DUCT AND DAMPER

PRESS-ON COLLAR FITTING WITH ROUND RIGID DUCT AND DAMPER

90° BRANCH TAKEOFF RADIUS BRANCH TAKEOFF

TURNING VANES

20X20

FS FS

12"Ø E-

12"Ø S-600

8

8 S

STATIC PRESSURE SENSOR SENSING LOCATION

RECTANGULAR OR FLAT OVAL DUCTWORK WITH CONICAL TAP AND FLAT OVAL OR ROUND BRANCH DUCT

TRANSITION FROM RECTANGULAR TO ROUND DUCTWORK BACKDRAFT DAMPER (BD), LOW LEAKAGE MANUAL DAMPER (LMD), OR CONTROL DAMPER (CD), FIRE DAMPER (FS), COMBINATION FIRE/SMOKE DAMPER, (FS)

MANUAL DAMPER FIRE DAMPER (FD), 3 HOUR FIRE DAMPER (FD3), SMOKE

DAMPER (SD), OR COMBINATION FIRE/SMOKE DAMPER (FS), HORIZONTAL POSITION. H DENOTES 286°F FUSIBLE LINKS.

SIDEWALL SUPPLY GRILLE OR REGISTER WITH SIZE, TYPE, AND CFM

SIDEWALL RETURN OR EXHAUST GRILLE OR REGISTER WITH SIZE, TYPE, AND CFM

CEILING RETURN OR EXHAUST GRILLE OR REGISTER WITH SIZE, TYPE, AND CFM

RIGID DUCT AND CEILING EXHAUST GRILLE WITH ROUND NECK SIZE, TYPE, AND CFM

FLEXIBLE DUCT AND CEILING SUPPLY DIFFUSER WITH ROUND NECK SIZE, TYPE, AND CFM

A-B-C 330 FLEXIBLE DUCT AND LINEAR DIFFUSER WITH LENGTH, TYPE, AND CFM. (A-SIZE; B-TYPE; C- NUMBER)

ACCESS DOOR, OPENING OUTWARD 24" x 24" CEILING RETURN GRILLE (R-PP UNLESS NOTED OTHERWISE)

TERMINAL UNIT WITH ELECTRIC REHEAT

**PIPING AND VALVES** PIPE CAP CLEANOUT (CO) IN DRAIN LINE **DIRECTION OF FLOW** ELBOW - 45° ELBOW - 90°

HYDRONIC PIPING DRAIN \_\_\_\_D\_\_ REFRIGERANT —— R ——

ELBOW - TURNED DOWN

ELBOW - TURNED UP

**CONTROLS AND SENSORS** 

TEMPERATURE SENSOR **HUMIDITY SENSOR** OCCUPIED/UNOCCUPIED SWITCH → NETWORK BACNET NETWORK CONNECTION SIGNAL FROM FIRE ALARM SYSTEM <del>---</del>FA FACP CONSTANT SPEED DRIVE FIRE ALARM CONTROL PANEL

CARBON DIOXIDE SENSOR DIFFERENTIAL PRESSURE SENSOR SENSING LOCATION STATIC PRESSURE SENSOR SENSING LOCATION CURRENT SENSING RELAY **END SWITCH** 

FIRE ALARM RELAY (BY DIVISION 28) HUMIDITY HIGH LIMIT SENSOR DUCT SMOKE DETECTOR BY FA

SMOKE DETECTOR

SYMBOLS AND **ABBREVIATIONS** 

SHEET:

**PERMIT SET** 

△ DATE DESCRIPTION 2023.04.03 Permit Set

### PROJECT GENERAL NOTES

<u>HVAC GENERAL</u>

1. DRAWINGS ARE DIAGRAMMATIC IN NATURE AND, UNLESS EXPLICITLY DIMENSIONED, INDICATE APPROXIMATE LOCATIONS OF APPARATUS, EQUIPMENT, DUCTWORK AND PIPING, CHANGES IN THE LOCATION, AND OFFSETS, OF SAME WHICH ARE NOT SHOWN ON THE DRAWINGS BUT ARE NECESSARY IN ORDER TO ACCOMMODATE BUILDING CONDITIONS AND COORDINATION WITH THE WORK OF OTHER TRADES, SHALL BE MADE DURING THE PREPARATION OF COORDINATION DRAWINGS AND PRIOR TO INITIAL INSTALLATION, WITHOUT ADDITIONAL COST TO THE OWNER.

2. DO NOT LOCATE DAMPERS, ACTUATORS, CONTROL COMPONENTS, ANY EQUIPMENT WITH MOVING PARTS OR ANY EQUIPMENT REQUIRING ACCESS OR REGULAR MAINTENANCE ABOVE INACCESSIBLE CEILINGS. OBTAIN PRIOR APPROVAL IF UNAVOIDABLE & PROVIDE AN ACCESS PANEL THAT WILL ALLOW SAFE AND PRACTICAL ACCESS.

PIPING, EQUIPMENT, OR DUCTWORK SHALL NOT BE INSTALLED IN ELECTRICAL EQUIPMENT ROOMS UNLESS SPECIFICALLY INDICATED ON THE DRAWINGS. IN ADDITION, PIPING, DUCTWORK, OR MECHANICAL EQUIPMENT SHALL NOT BE INSTALLED IN THE SPACE EQUAL TO THE WIDTH AND DEPTH OF SWITCHGEAR, SWITCHBOARDS, PANELBOARDS, AND MOTOR CONTROL CENTERS FROM FLOOR TO STRUCTURE ABOVE NOR WITHIN THE WORKING SPACE IN FRONT, REAR AND/OR SIDE (WHERE REAR AND/OR SIDE ACCESS IS REQUIRED TO WORK ON EQUIPMENT) OF ELECTRICAL EQUIPMENT (SWITCHGEAR, SWITCHBOARDS, PANELBOARDS, MOTOR CONTROL CENTERS, VARIABLE FREQUENCY DRIVES, TRANSFORMERS, AND STARTERS), DIMENSIONS OF THE WORKING SPACE SHALL BE A MINIMUM DEPTH OF 42" HORIZONTALLY, THE WIDTH OF THE EQUIPMENT OR 30", WHICHEVER IS GREATER, AND THE HEIGHT OF THE EQUIPMENT OR 78", WHICHEVER IS GREATER, MINIMUM DEPTH SHALL BE INCREASED TO 60" FOR EQUIPMENT RATED OVER 600 V.

4. MOUNT SPACE CO2 SENSORS. SPACE TEMPERATURE SENSORS. AND THERMOSTATS AT 48" ABOVE THE FLOOR.

A. ALIGN HORIZONTALLY WITH ADJACENT LIGHT SWITCHES.

B. FINAL LOCATIONS SHALL BE ACCESSIBLE AND SHALL BE COORDINATED WITH THE FURNITURE LAYOUT AND ARCHITECTURAL

C. MORE THAN 2 SENSORS IN A SINGLE LOCATION SHALL BE INSTALLED WITH A COMMON FACEPLATE TO MINIMIZE WALL SPACE.

5. PROVIDE INSULATED BASES FOR THERMOSTATS AND TEMPERATURE SENSORS INSTALLED ON EXTERIOR WALLS OR WALLS TO UNCONDITIONED SPACES.

6. PROVIDE PREFABRICATED INSULATED EQUIPMENT SUPPORT CURBS FOR EQUIPMENT LOCATED ON THE ROOF, FLASH WITH SHEET METAL AND TRIM WITH ROOFING AND SEALANT TO MATCH ROOFING. FOR ALL PIPING PENETRATIONS PROVIDE FLASHING COLLARS AND TRIM WITH ROOFING AND SEALANT TO MATCH ROOFING.

7. HVAC/ELECTRICAL DESIGN COORDINATION:

A. THE POWER RATINGS OF MOTORS AND OTHER HVAC EQUIPMENT AND THE ELECTRICAL CHARACTERISTICS OF ELECTRICAL SYSTEMS SERVING THEM, AS SPECIFIED HEREIN AND INDICATED ON THE DRAWINGS, HAVE BEEN ESTABLISHED AS MINIMUMS WHICH WILL ALLOW THAT EQUIPMENT TO SATISFACTORILY FUNCTION WHILE PRODUCING THE REQUIRED CAPACITIES. THESE POWER RATINGS INCLUDE A SAFETY FACTOR DEEMED APPROPRIATE TO ACCOMMODATE COMMON DIFFERENCES BETWEEN DESIGN PARAMETERS AND FIELD CONSTRUCTION PRACTICES. UNDER NO CIRCUMSTANCES SHALL EQUIPMENT WITH POWER RATINGS LESS THAN THOSE INDICATED ON THE DRAWINGS OR SPECIFIED HEREIN BE PROVIDED.

B. REASONABLE EFFORTS HAVE BEEN MADE TO COORDINATE THE ELECTRICAL REQUIREMENTS OF THE HVAC EQUIPMENT WITH THE ELECTRICAL SYSTEMS SERVING THAT EQUIPMENT. DIFFERENCES AMONG MANUFACTURERS OF HVAC EQUIPMENT MAKE IT IMPOSSIBLE TO PRODUCE A SINGLE ELECTRICAL DESIGN WHICH WILL SATISFY THE VARYING ELECTRICAL REQUIREMENTS OF THOSE MANUFACTURERS. CONSEQUENTLY, THE CONTRACTOR SHALL COORDINATE THE ELECTRICAL REQUIREMENTS OF THE HVAC EQUIPMENT ACTUALLY FURNISHED ON THIS PROJECT AND PROVIDE THE ELECTRICAL SYSTEMS REQUIRED BY THAT EQUIPMENT. THIS COORDINATION EFFORT SHALL BE COMPLETED PRIOR TO THE INSTALLATION OF EITHER THE HVAC EQUIPMENT OR THE ELECTRICAL SYSTEMS SERVING THAT EQUIPMENT. ELECTRICAL SYSTEM REVISIONS REQUIRED TO COORDINATE WITH THE HVAC EQUIPMENT ACTUALLY FURNISHED SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.

8. MOTOR QUANTITIES, SIZES AND EQUIPMENT WATTAGE RATINGS SPECIFIED HEREIN OR INDICATED ON THE DRAWINGS ARE THE MINIMUM REQUIREMENTS, UNLESS NOTED OTHERWISE, MOTOR QUANTITIES, SIZES AND EQUIPMENT WATTAGE RATINGS LESS THAN THOSE SPECIFIED HEREIN OR INDICATED ON THE DRAWINGS ARE NOT ACCEPTABLE, LARGER MOTOR SIZES AND EQUIPMENT WATTAGE RATINGS MAY ONLY BE PROVIDED IF NECESSARY, TO MEET THE PRESCRIPTIVE REQUIREMENTS SPECIFIED HEREIN OR INDICATED ON THE DRAWINGS. WHERE MULTIPLE MOTORS OR MOTOR SIZES OR EQUIPMENT WATTAGE RATINGS LARGER THAN SPECIFIED HEREIN OR INDICATED ON THE DRAWINGS ARE FURNISHED, PROVIDE AND COORDINATE THE CORRESPONDING INCREASED NUMBER OR CAPACITY OF FEEDERS AND OTHER ELECTRICAL EQUIPMENT SERVING THEM, AT NO ADDITIONAL COST TO

9. ALL ELECTRICAL WORK IN CEILING CAVITIES USED AS RETURN AIR PLENUMS SHALL USE PLENUM RATED CABLE OR WIRING IN

10. PROTECT ALL MATERIALS AND EQUIPMENT FROM DAMAGE.

11. INSTALLATION OF ALL EQUIPMENT SHALL PERMIT ACCESSIBILITY FOR SERVICE AND/OR REPLACEMENT.

12. THE INSTALLATION OF MOTOR STARTERS THAT ARE NOT FACTORY-INSTALLED, THERMAL OVERLOAD SWITCHES, AND POWER WIRING TO MOTORS, STARTERS, THERMAL OVERLOAD SWITCHES, ELECTRIC HEATING COILS, ELECTRIC HUMIDIFIERS, AND CONTACTORS, IS SPECIFIED IN ANOTHER DIVISION. THIS SECTION INCLUDES THE FURNISHING AND INSTALLATION OF CONTROLS AND WIRING FOR AUTOMATIC CONTROLS, ELECTRIC DAMPER AND VALVE ACTUATORS AND MOTORS, TERMINAL UNIT CONTROLLERS, INTERLOCKS, STARTING CIRCUITS, AND 120 V AND LOW VOLTAGE POWER WIRING TO POWER CONSUMING CONTROL DEVICES.

13. SEAL ALL EXTERIOR WALL PENETRATIONS WATERPROOF

14. COORDINATE ALL WALL, CEILING, FLOOR, ROOF, AND BEAM PENETRATIONS WITH ARCHITECT AND STRUCTURAL ENGINEER.

15. PROVIDE ALL MISCELLANEOUS STRUCTURAL SUPPORTS REQUIRED FOR DUCTWORK, PIPING, AND EQUIPMENT INSTALLATIONS.

16. COLOR AND FINISHES FOR ALL EXPOSED EQUIPMENT (REGISTERS, UNIT HEATERS, ETC.) SHALL BE SELECTED BY ARCHITECT, UNLESS OTHERWISE NOTED.

# <u>MOTORS</u>

1. PROVIDE MOTORS FOR EQUIPMENT COVERED IN DIVISION 23 UNLESS OTHERWISE SPECIFIED HEREIN. SELECT MOTORS FOR OPERATION NOT EXCEEDING A 1.0 SERVICE FACTOR AND WITHIN THE NAMEPLATE AMPERAGE AND NOMINAL POWER RATING.

2. MOTORS INDICATED ON THE DRAWINGS AS BEING CONTROLLED BY VARIABLE FREQUENCY DRIVES SHALL BE PROVIDED WITH FACTORY-INSTALLED SHAFT GROUNDING RINGS, WHICH SHALL CONSIST OF A CIRCUMFERENTIAL RING OF CONDUCTIVE MICROFIBERS THAT DISCHARGE SHAFT VOLTAGES TO GROUND.

## **VIBRATION ISOLATION**

A. MANUFACTURER: AEGIS SGR.

1. SELECT AND LOCATE VIBRATION ISOLATION EQUIPMENT FOR UNIFORM LOADING AND DEFLECTION, ACCORDING TO WEIGHT DISTRIBUTION OF EQUIPMENT.

2. VIBRATION ISOLATORS SHALL BE INSTALLED AND CONNECTED AS SPECIFIED OR INDICATED ON THE DRAWINGS IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS AND CERTIFIED SUBMITTAL DATA.

3. THERE SHALL BE NO RIGID CONTACT OF PIPING, DUCTWORK, VIBRATION ISOLATED EQUIPMENT, CONDUIT CONNECTED TO VIBRATION ISOLATED EQUIPMENT, OR OTHER ELEMENTS RIGIDLY CONNECTED TO VIBRATION ISOLATED EQUIPMENT WITH WALLS, FLOOR SLABS, ROOF-CEILING ASSEMBLIES, STRUCTURAL ELEMENTS, FRAMING ELEMENTS, OR ANY OTHER NON-ISOLATED ITEM EXCEPT FOR FIRE DAMPER INSTALLATION CONDITIONS AS APPROVED BY THE ENGINEER AND AS SHOWN IN PROJECT DETAILS AND DOCUMENTS.

4. NO RIGID CONNECTION SHALL BE MADE THAT DEGRADES THE NOISE AND VIBRATION CONTROL SYSTEMS PROVIDED IN THE SPECIFICATIONS OR DRAWING.

5. PRIOR TO STARTUP, CLEAN OUT FOREIGN MATTER BETWEEN BASES, ISOLATORS, EQUIPMENT, AND MOUNTING SURFACES. VERIFY THAT THERE ARE NO RIGID CONNECTIONS BETWEEN EQUIPMENT AND BUILDING STRUCTURE.

ABSENCE OF STEEL RAIL OR STEEL BASE ISOLATION BASES SCHEDULED ON DRAWINGS SHALL NOT PRECLUDE THEIR USE. COORDINATE WITH THE MANUFACTURER IF INSTALLATION CONDITIONS WARRANT THEIR USE ONCE SPECIFIC EQUIPMENT SELECTION IS FINALIZED.

7. CONFLICTS WITH OTHER TRADES THAT WILL RESULT IN DIRECT CONTACT WITH ISOLATED EQUIPMENT, PIPING, OR DUCTWORK, SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO INSTALLATION.

8. DISCREPANCIES BETWEEN THE SPECIFICATIONS AND THE FIELD CONDITIONS, OR CHANGES REQUIRED DUE TO SPECIFIC EQUIPMENT SELECTION SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO INSTALLATION.

9. ISOLATED EQUIPMENT MOUNTING SYSTEMS SHALL PERMIT EQUIPMENT MOTION IN ALL DIRECTIONS.

10. ISOLATOR HANGERS SHALL BE INSTALLED WITH HOUSINGS A MINIMUM OF 2" BELOW BUT AS CLOSE TO THE STRUCTURE AS

11. PROVIDE HEIGHT SAVING BRACKETS WHERE RECOMMENDED BY THE MANUFACTURER FOR EQUIPMENT STABILITY, OR OPERATING

12. ALL BOLTED CONNECTIONS THROUGH TYPE NP ISOLATION PADS OR OTHER ELASTOMERIC VIBRATION ISOLATION LAYERS SHALL BE PROVIDED TYPE IWG ISOLATION GROMMET AND WASHER TO PREVENT SHORT CIRCUITING OF ISOLATION AT BOLTED CONNECTIONS.

13. EXTERNAL ISOLATORS ARE REQUIRED FOR ALL VIBRATION ISOLATED EQUIPMENT UNLESS ALL OF THE FOLLOWING REQUIREMENTS ARE SATISFIED:

A. INTERNAL SPRING ISOLATION OF FAN(S) AND MOTOR(S) SHALL ACHIEVE THE STATIC DEFLECTION REQUIREMENTS OF VIBRATION ISOLATION SCHEDULED.

B. EXTERNAL ELASTOMERIC ISOLATION FROM A SPECIFICATION 230548 LISTED ISOLATOR TYPE THAT ACHIEVES A MINIMUM 0.25" STATIC DEFLECTION SHALL BE PROVIDED FOR THE ENTIRE UNIT IN ADDITION TO INTERNALLY SPRING ISOLATED FAN(S) AND MOTOR(S).

C. ALL OTHER INTERNAL ROTATING OR RECIPROCATING COMPONENTS, SUCH AS COMPRESSORS AND CONDENSERS, SHALL BE PROVIDED ON

D. EXTERNAL SPRING ISOLATION SYSTEMS ARE NOT SPECIFICALLY SCHEDULED, NOTED, OR DETAILED TO BE REQUIRED.

14. ALL INTERNAL SPRING ISOLATORS SHALL BE LOCKED DOWN AND INOPERABLE FOR EQUIPMENT PROVIDED ON EXTERNAL SPRING ISOLATION.

15. NON-VIBRATION ISOLATED PIPING, OR OTHER NON-ISOLATED ELEMENTS SUCH AS CONDUIT, SHALL NOT BE MOUNTED ON VIBRATION ISOLATED TRAPEZE.

16. FLEXIBLE CONNECTIONS ARE REQUIRED FOR ALL VIBRATION ISOLATED EQUIPMENT DUCTWORK, AND ELECTRICAL CONNECTIONS. RIGID CONTACT ACROSS FLEXIBLE CONNECTIONS SHALL NOT BE ALLOWED.

17. ALL ELECTRICAL CONNECTIONS TO VIBRATION ISOLATED EQUIPMENT SHALL BE MADE WITH FLEXIBLE CONDUIT IN A LOOSE 360- DEGREE LOOP.

18. ALL INTAKE AND DISCHARGE DUCTWORK SHALL BE CONNECTED TO VIBRATION PRODUCING MECHANICAL EQUIPMENT WITH FLEXIBLE DUCT CONNECTIONS WITH A MINIMUM OF 2" OF SEPARATION. FLEXIBLE CONNECTIONS SHALL NOT BE USED TO CORRECT FOR MISALIGNMENT AND SHALL NOT BE ALLOWED TO CREATE A BULGE WHEN OPERATED UNDER PRESSURE

19. WHEN MECHANICAL EQUIPMENT IS OPERATING AT 2" OF WATER OR MORE STATIC PRESSURE OR WHEN EQUIPMENT THRUST, FORCES EXCEED 10% OF THE EQUIPMENT WEIGHT HORIZONTAL THRUST RESTRAINTS ARE REQUIRED. SIZE AND ADJUST TO LIMIT LATERAL MOVEMENT TO 0.25" OR LESS UNDER NORMAL OPERATIONAL STATIC PRESSURES.

20. ALL DUCT, PIPE, CONDUIT, OR OTHER MECHANICAL EQUIPMENT PENETRATIONS THROUGH MECHANICAL SPACE PARTITIONS, EXTERIOR WALLS, ROOFTOPS, ACOUSTICALLY RATED PARTITIONS, FIRE RATED PARTITIONS, FULL HEIGHT PARTITIONS, AND PARTITIONS AT OCCUPIED SPACES SHALL BE SEALED BY MAINTAINING A MINIMUM 1/4" ANNULAR SPACE AROUND THE PENETRATION ELEMENTS. ANNULAR CAVITY TO BE PACKED WITH MINERAL WOOL OR FIBERGLASS 100 FULL ON ALL SIDES AND SEALED WITH ACOUSTICAL SEALANT OR NON-HARDENING FIRESTOP AS REQUIRED, ALL CAULKING AT MECHANICAL EQUIPMENT PENETRATIONS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C919-2012 (2017). ALL DUCTS, ALL PIPES, AND CONDUITS CONNECTED TO VIBRATING EQUIPMENT SHALL BE SUPPORTED ON BOTH SIDES OF THE PENETRATION WITHIN 12". NO WEIGHT MAY REST ON THE PARTITION, AND NO RIGID CONTACT BETWEEN THE PENETRATING ELEMENT AND ANY ELEMENT OF THE PARTITION OR INTERNAL TO THE PARTITION SHALL BE MADE. THE PARTITION SHALL NOT BE USED TO GUIDE THE PENETRATION ELEMENT.

### HVAC PERFORMANCE VERIFICATION

NEOPRENE ISOLATION MOUNTS

A. SUBMIT ADDITIONAL DOCUMENTATION AS REQUIRED TO SUPPORT THE PERFORMANCE VERIFICATION PROCESS. THIS ADDITIONAL SUBMITTAL DOCUMENTATION SHALL INCLUDE, AT A MINIMUM, THE PROPOSED START-UP AND INITIAL CHECK-OUT PROCEDURES, AND PREFUNCTIONAL CHECKLISTS.

2. START-UP PLAN AND PREFUNCTIONAL TESTING

A. PREFUNCTIONAL TESTING SHALL BE REQUIRED FOR EACH PIECE OF EQUIPMENT TO ENSURE THAT THE EQUIPMENT AND SYSTEMS ARE PROPERLY INSTALLED AND READY FOR OPERATION, SO THAT FUNCTIONAL TESTING MAY PROCEED WITHOUT DELAYS. FOLLOW THE APPROVED START-UP, INITIAL CHECK-OUT, AND PREFUNCTIONAL TESTING PROCEDURES. SAMPLING STRATEGIES SHALL NOT BE USED FOR PREFUNCTIONAL TESTING. THE PREFUNCTIONAL TESTING FOR EQUIPMENT AND SUBSYSTEMS OF A GIVEN SYSTEM SHALL BE SUCCESSFULLY COMPLETED AND DOCUMENTED PRIOR TO FUNCTIONAL TESTING OF THE SYSTEM.

B. PROCEDURES FOR PERFORMANCE VERIFICATION SHALL INCLUDE:

1. START-UP AND INITIAL CHECK-OUT PLAN: DEVELOP THE DETAILED START-UP AND PREFUNCTIONAL TESTING PLANS FOR EQUIPMENT AND SYSTEMS. THAT ARE TO BE PERFORMANCE VERIFIED, AS SPECIFIED HEREIN. REVIEW THE PROPOSED PROCEDURES AND PREFUNCTIONAL TESTING DOCUMENTATION TO ENSURE THAT THERE IS WRITTEN DOCUMENTATION THAT EACH OF THE MANUFACTURER-RECOMMENDED PROCEDURES HAVE BEEN COMPLETED.

2. THE START-UP AND INITIAL CHECK-OUT PLAN SHALL CONSIST, AS A MINIMUM, OF THE FOLLOWING A. THE MANUFACTURER'S STANDARD WRITTEN START-UP AND CHECK-OUT PROCEDURES COPIED FROM THE INSTALLATION MANUALS AND MANUFACTURER'S NORMALLY USED FIELD CHECK-OUT SHEETS. THE PLAN SHALL INCLUDE CHECKLISTS AND PROCEDURES WITH SPECIFIC BOXES OR LINES FOR RECORDING AND DOCUMENTING THE CHECKING AND INSPECTIONS OF EACH PROCEDURE AND A SUMMARY

B. FIRST-RUN CHECKLIST FOR EQUIPMENT PER SPECIFICATIONS FOR EACH PIECE OF EQUIPMENT.

C. CONTRACTOR-DEVELOPED PREFUNCTIONAL CHECKLISTS.

STATEMENT WITH A SIGNATURE BLOCK AT THE END OF THE PLAN.

3. IDENTIFY WHICH TRADE IS RESPONSIBLE FOR EXECUTING AND DOCUMENTING EACH OF THE LINE ITEM TASKS AND NOTE THAT TRADE ON THE FORM, EACH FORM MAY HAVE MORE THAN ONE TRADE RESPONSIBLE FOR ITS EXECUTION,

C. FOUR WEEKS PRIOR TO START-UP. SCHEDULE EQUIPMENT AND SYSTEMS START-UP AND CHECK-OUT AND NOTIFY THE ARCHITECT IN WRITING THE EXECUTION OF THE PREFUNCTIONAL CHECKLISTS, START-UP AND CHECK-OUT SHALL BE DIRECTED AND PERFORMED BY THE CONTRACTOR. IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED PROCEDURES. THE ARCHITECT SHALL BE PRESENT FOR THE START-UP, CHECK-OUT, AND PREFUNCTIONAL TESTING OF THE FIRST UNIT OF EACH TYPE OF EQUIPMENT, AND ANY OTHER TESTS HE DESIGNATES.

D. SENSOR CALIBRATION: CALIBRATION OF SENSORS ASSOCIATED WITH A GIVEN PIECE OF EQUIPMENT OR SYSTEM SHALL BE INCLUDED AS PART OF THE PREFUNCTIONAL TESTING. AND LISTED ON THE APPROPRIATE TEST CHECKLISTS AND REPORTS FOR THE SYSTEM. THIS REQUIREMENT MAY BE MET DURING THE PREFUNCTIONAL TESTING OF THE BUILDING CONTROL SYSTEM, BUT SHALL ALSO BE DOCUMENTED WITH THE FUNCTIONAL TESTING PROCEDURES.

E. COMPLETED START-UP, CHECK-OUT, AND PREFUNCTIONAL TEST FORMS SHALL BE COMPLETED AND MADE AVAILABLE FOR REVIEW UPON REQUEST. TO THE ARCHITECT FOR REVIEW. LIST OUTSTANDING ITEMS OF THE INITIAL START-UP AND PREFUNCTIONAL PROCEDURES THAT WERE NOT COMPLETED SUCCESSFULLY, AT THE BOTTOM OF THE PROCEDURES FORM OR ON AN ATTACHED SHEET. THE PROCEDURES FORM AND ANY OUTSTANDING DEFICIENCIES SHALL BE PROVIDED TO THE ARCHITECT WITHIN 2 DAYS OF TEST COMPLETION. THE ARCHITECT SHALL REVIEW THE CONTRACTOR'S START-UP AND PREFUNCTIONAL TESTING REPORTS AND SHALL SUBMIT EITHER A NONCOMPLIANCE REPORT OR AN APPROVAL FORM TO THE CONTRACTOR. THE CONTRACTOR SHALL CORRECT ITEMS THAT ARE DEFICIENT OR INCOMPLETE IN THE CHECKLISTS AND TESTS IN A TIMELY MANNER, AND SHALL NOTIFY THE ARCHITECT AS SOON AS OUTSTANDING ITEMS HAVE BEEN CORRECTED AND RESUBMIT AN UPDATED START-UP REPORT AND A STATEMENT OF CORRECTION ON THE ORIGINAL NONCOMPLIANCE REPORT. WHEN REQUIREMENTS ARE COMPLETED, THE ARCHITECT SHALL RECOMMEND APPROVAL OF THE START-UP AND PREFUNCTIONAL TESTING OF EACH SYSTEM AND SCHEDULE THE FUNCTIONAL TESTING OF THE EQUIPMENT OR SYSTEM.

F. COMPLETE START-UP AND PREFUNCTIONAL TESTING FOR A SYSTEM BEFORE FUNCTIONAL TEST OF THAT SYSTEM MAY PROCEED.

G. DO NOT OPERATE HVAC SYSTEMS IN A MODE THAT WOULD INDUCE UNCONDITIONED, HUMID OUTSIDE AIR INTO THE BUILDING.

3. RETESTING OF EQUIPMENT AND/OR SYSTEMS

A. PROVIDE LABOR AND MATERIALS REQUIRED FOR RETESTING OF ANY FUNCTIONAL TEST FOUND TO BE DEFICIENT.

B. PRIOR TO RETESTING, SUBMIT REQUIRED DATA INDICATING THAT THE DEFICIENT ITEMS HAVE BEEN COMPLETED AND/OR CORRECTED TO THE ARCHITECT FOR APPROVAL AND RESCHEDULING OF THE FUNCTIONAL TEST. IF DURING THE RETESTING IT BECOMES APPARENT THAT THE DEFICIENT ITEMS HAVE NOT BEEN COMPLETED AND/OR CORRECTED AS INDICATED IN THE DATA PROVIDED BY THE CONTRACTOR, THE RETESTING SHALL BE STOPPED. COSTS FOR THE DESIGN TEAM TO FURTHER SUPERVISE THE RETESTING OF A FUNCTIONAL TEST SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

4. DEFERRED TESTING

A. SCHEDULE AND COORDINATE, WITH THE APPROVAL OF THE ARCHITECT, ANY REQUIRED SEASONAL TESTING, TESTS DELAYED UNTIL BUILDING CONSTRUCTION IS COMPLETED, REQUIRED BUILDING OCCUPANCY OR LOADING, WEATHER, OR OTHER CONDITIONS ARE SUITABLE FOR THE DEMONSTRATION OF EQUIPMENT OR SYSTEM'S PERFORMANCE. AS SPECIFIED HEREIN. DEFERRED TESTING SHALL BE EXECUTED, DOCUMENTED, AND DEFICIENCIES CORRECTED AS SPECIFIED HEREIN FOR FUNCTIONAL TESTING. ADJUSTMENTS OR CORRECTIONS TO THE OPERATIONS AND MAINTENANCE MANUALS AND AS-BUILT DOCUMENTS REQUIRED BY THE RESULTS OF THE TESTING SHALL BE MADE BEFORE THE SEASONAL TESTING PROCESS IS CONSIDERED COMPLETE.

5. SEASONAL ADJUSTMENTS

A. THE HVAC PERFORMANCE VERIFICATION SUPERVISOR SHALL SCHEDULE. COORDINATE AND COMPLETE THE SEASONAL ADJUSTMENT PROCESS. DURING THIS EFFORT, THE HVAC PERFORMANCE VERIFICATION SUPERVISOR SHALL:

1. CHECK AND VERIFY THE CALIBRATION OF TEMPERATURE CONTROL DEVICES AND THERMOSTATS. TEST AND VERIFY CONTROL SEQUENCES FOR PROPER OPERATION FOR THE SEASON.

2. CHECK THE OPERATION, PERFORMANCE, AND BALANCE OF AIR SYSTEMS TO PROVIDE UNIFORM DISTRIBUTION AND COMFORT CONDITIONS.

6. WHERE DEFICIENT OPERATION OR DEFECTIVE EQUIPMENT IS DISCOVERED, PROVIDE CORRECTIVE MEASURES.

7. TESTING DOCUMENTATION, NONCONFORMANCE, AND APPROVALS

A. LIST OUTSTANDING ITEMS OF THE INITIAL START-UP AND PREFUNCTIONAL PROCEDURES THAT WERE NOT COMPLETED SUCCESSFULLY. AT THE BOTTOM OF THE FUNCTIONAL TEST PROCEDURE FORMS OR ON AN ATTACHED SHEET. THE FUNCTIONAL TEST PROCEDURE FORMS AND ANY OUTSTANDING DEFICIENCIES SHALL BE PROVIDED TO THE ARCHITECT WITHIN 2 DAYS OF TEST COMPLETION. THE ARCHITECT SHALL REVIEW THE CONTRACTOR'S START-UP AND PREFUNCTIONAL TESTING DOCUMENTATION AND SHALL SUBMIT EITHER A NONCOMPLIANCE REPORT OR AN APPROVAL FORM TO THE CONTRACTOR. WORK WITH THE ARCHITECT TO CORRECT AND RETEST DEFICIENCIES OR UNCOMPLETED ITEMS. CORRECT ITEMS THAT ARE DEFICIENT OR INCOMPLETE IN A TIMELY MANNER, AND NOTIFY THE ARCHITECT AS SOON AS OUTSTANDING ITEMS HAVE BEEN CORRECTED AND RESUBMIT AN UPDATED START-UP REPORT AND A STATEMENT OF CORRECTION ON THE ORIGINAL NONCOMPLIANCE REPORT. WHEN REQUIREMENTS ARE COMPLETED, SCHEDULE THE FUNCTIONAL TESTING OF THE EQUIPMENT OR SYSTEM.

B. AS FUNCTIONAL PERFORMANCE TESTING PROGRESSES AND DEFICIENCIES ARE IDENTIFIED, WORK WITH THE ARCHITECT TO RESOLVE THE ISSUES.

8. OPERATION AND MAINTENANCE MANUALS

A. THE HVAC PERFORMANCE VERIFICATION SUPERVISOR CONTRACTOR SHALL COMPILE AND PREPARE DOCUMENTATION FOR EQUIPMENT AND SYSTEMS COVERED IN DIVISION 23 AND DELIVER THIS DOCUMENTATION FOR INCLUSION IN THE OPERATION AND MAINTENANCE MANUALS PRIOR TO THE TRAINING OF THE OWNER'S PERSONNEL

9. INSTRUCTION OF OPERATING PERSONNEL

A. THE CONTRACTOR SHALL SCHEDULE, COORDINATE AND ASSEMBLE, AND DELIVER THE DOCUMENTATION OF TRAINING REQUIRED BY

10.FUNCTIONAL TESTS

A. FUNCTIONAL TEST REQUIREMENTS FOR THE DEMONSTRATION OF PROPER SYSTEM AND EQUIPMENT OPERATION SHALL BE DEFINED BY THE HVAC PERFORMANCE VERIFICATION SUPERVISOR. EXECUTION OF THESE TEST AND DEMONSTRATION OF THE REQUIRED PERFORMANCE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

B. FUNCTIONAL TESTING IS INTENDED TO BEGIN UPON COMPLETION OF A SYSTEM. FUNCTIONAL TESTING MAY PROCEED PRIOR TO THE COMPLETION OF SYSTEMS OR SUBSYSTEMS AT THE DISCRETION OF THE CONTRACTOR. BEGINNING SYSTEM TESTING BEFORE FULL COMPLETION OF CONSTRUCTION SHALL NOT RELIEVE THE CONTRACTOR FROM FULLY COMPLETING THE SYSTEM, INCLUDING PREFUNCTIONAL CHECKLISTS.

C. FUNCTIONAL TESTING SHALL BE COMPLETED AND TEST DOCUMENTATION APPROVED BY THE ARCHITECT BEFORE THE PROJECT WILL BE CONSIDERED SUBSTANTIALLY COMPLETE.

TESTING, ADJUSTING AND BALANCING

1. TESTING, ADJUSTING AND BALANCING

A. PROVIDE MATERIALS, EQUIPMENT, LABOR, AND POWER TO TEST, ADJUST, AND PROPORTIONALLY BALANCE NEW HEATING, VENTILATING, REFRIGERATION, AND AIR CONDITIONING SYSTEMS AND COMPONENTS AS INDICATED ON THE DRAWINGS AND AS SPECIFIED. VERIFY FUNCTIONING OF OPERATING DEVICES AND EQUIPMENT. IN ADDITION, THE FOLLOWING SPECIFIC TESTING, ADJUSTING AND BALANCING SHALL BE PERFORMED.

1. DUCTWORK LEAKAGE TESTING:

A. FOR DUCTWORK WITH STATIC PRESSURE CLASSIFICATION OF 4" WG, 6" WG, OR 10" WG, A LEAKAGE TEST SHALL BE MADE AFTER INSTALLATION OF THE FIRST REPRESENTATIVE SAMPLE OF DUCTWORK OF EACH CLASSIFICATION. THE TEST SAMPLE SHALL INCORPORATE AT LEAST: 5 TRANSVERSE JOINTS, TYPICAL SEAMS, ONE ELBOW, 2 TYPICAL BRANCH CONNECTIONS, AFTER SATISFACTORY RESULTS FOR THE TEST SAMPLE, ADDITIONAL DUCTWORK SHALL BE TESTED TOTALING NO LESS THAN 25% OF THE TOTAL DUCT AREA FOR EACH PRESSURE CLASS. REMAINING DUCT SECTIONS SHALL BE TESTED UNTIL THE TOTAL DUCT AREA FOR EACH PRESSURE CLASS HAS BEEN TESTED.

B. FOR DUCTWORK WITH STATIC PRESSURE CLASSIFICATION OF 3" WG, A LEAKAGE TEST SHALL BE MADE AFTER INSTALLATION OF THE FIRST REPRESENTATIVE SAMPLE OF DUCTWORK. THE TEST SAMPLE SHALL INCORPORATE AT LEAST: 5 TRANSVERSE JOINTS, TYPICAL SEAMS, ONE ELBOW, 2 TYPICAL BRANCH CONNECTIONS. AFTER SATISFACTORY RESULTS FOR THE TEST SAMPLE, ADDITIONAL DUCTWORK SHALL BE TESTED TOTALING NO LESS THAN 25% OF THE TOTAL DUCT AREA. AFTER SATISFACTORY RESULTS FOR THE TEST SAMPLE, REMAINING DUCT SECTIONS SHALL BE TESTED UNTIL THE TOTAL DUCT AREA HAS BEEN TESTED.

C. FOR DUCTWORK WITH STATIC PRESSURE CLASSIFICATION OF 0.5" WG, 1" WG, OR 2" WG, A LEAKAGE TEST SHALL BE MADE AFTER INSTALLATION OF THE FIRST REPRESENTATIVE SAMPLE OF DUCTWORK OF EACH CLASSIFICATION. THE TEST SAMPLE SHALL INCORPORATE AT LEAST: 5 TRANSVERSE JOINTS, TYPICAL SEAMS, ONE ELBOW, 2 TYPICAL BRANCH CONNECTIONS. AFTER SATISFACTORY RESULTS FOR THE TEST SAMPLE, ADDITIONAL DUCTWORK SHALL BE TESTED TOTALING NO LESS THAN 25% OF THE TOTAL DUCT AREA FOR EACH PRESSURE CLASS.

D. PRIOR TO TESTING. SUBMIT DRAWINGS INDICATING SECTIONS OF DUCTWORK TO BE TESTED. INCLUDING AREA CALCULATIONS.

E. LEAKAGE TESTING SHALL BE PERFORMED IN ACCORDANCE WITH SMACNA HVAC AIR DUCT LEAKAGE TEST MANUAL-2012.

F. TEST PRESSURE SHALL EQUAL THE STATIC PRESSURE CLASSIFICATION FOR THE DUCT.

G. LEAKAGE IN EACH TYPE OF DUCTWORK SHALL NOT EXCEED:

1. RECTANGULAR DUCTWORK

A. <u>STATIC PRESSURE</u> CLASSIFICATION, WG 0.5", 1", 2

2. ROUND AND FLAT OVAL DUCTWORK:

A. <u>STATIC PRESSURE</u> CLASSIFICATION, WG 0.5", 1", 2"

H. SUBMIT A REPORT CERTIFYING DUCTWORK TESTING AND RESULTS.

I. IN ADDITION TO THE TESTS SPECIFIED HEREIN, TEST DUCTWORK LOCATED OUTDOORS IN ACCORDANCE WITH THE CRITERIA SPECIFIED HEREIN FOR THE PRESSURE CLASSIFICATION OF THE DUCTWORK.

J. DUCTWORK FAILING TESTS SHALL BE RECONSTRUCTED AND RETESTED UNTIL SATISFACTORY, BEFORE ADDITIONAL DUCTWORK IS INSTALLED AND BEFORE DUCTWORK IS CONCEALED.

K. POSITIVE PRESSURE TESTING MAY BE USED FOR NEGATIVE PRESSURE DUCTWORK.

AIR SYSTEMS BALANCING, GENERAL:

A. VARIABLE FREQUENCY DRIVES SHALL BE SET UP AND TESTED TO VERIFY:

1. DESIGN CONDITIONS:

A. VERIFY FAN CAN PRODUCE DESIGN FLOW AT DESIGN TOTAL STATIC PRESSURE WITHOUT OVERLOADING THE FAN MOTOR WHILE OPERATING AT, OR LESS THAN 100% INPUT SIGNAL.

2. INSTALLED CONDITIONS:

DRAWINGS.

A. VERIFY FAN CAN PRODUCE DESIGN FLOW AT INSTALLED TOTAL STATIC PRESSURE WITHOUT OVERLOADING THE FAN MOTOR WHILE OPERATING AT, OR LESS THAN 100% INPUT SIGNAL. SIMULATE FILTER LOADING AS NEEDED TO ESTABLISH DESIGN FILTER PRESSURE DROP ALLOWANCE.

B. VERIFY AFTER SYSTEM BALANCE THAT FAN CAN OPERATE AT 100% INPUT SIGNAL WITHOUT OVERLOADING FAN MOTOR OR CREATING EXCESSIVE INLET OR DISCHARGE PRESSURES. RESCALE INPUT SIGNAL AS NEEDED TO PREVENT MOTOR OVERLOAD OR EXCESSIVE PRESSURES.

B. BALANCE AIR HANDLING UNITS SUCH THAT DUCT STATIC PRESSURES ARE MAINTAINED AS LOW AS POSSIBLE WHILE MAINTAINING MINIMUM INLET STATIC PRESSURE AND AIRFLOW REQUIREMENTS AT EACH TERMINAL UNIT.

C. TOTAL SUPPLY, RETURN AND OUTSIDE AIR AIRFLOW FOR EACH AIR HANDLING UNIT SHALL BE MEASURED USING PITOT TUBE DUCT TRAVERSES. WHERE THE OUTSIDE AIR INLET CONFIGURATION IS INSUFFICIENT FOR A PITOT TUBE DUCT TRAVERSE, THE OUTSIDE AIR SHALL BE CALCULATED AS THE DIFFERENCE BETWEEN THE SUPPLY AND RETURN.

D. DETERMINE THE MINIMUM AND MAXIMUM SUPPLY DUCT STATIC PRESSURE SETPOINTS. AS DESCRIBED IN THE AIR HANDLING UNIT CONTROLS SEQUENCES ON THE DRAWINGS.

E. FOR SYSTEMS WITH DIVERSITY, WITH THE FAN UNDER CONTROL AND LOADS COMMANDED TO MINIMUM FLOW SETPOINT TO SIMULATE DIVERSITY, VERIFY DESIGN FLOW THROUGH EACH TERMINAL UNIT. DIVERSITY SHALL BE CALCULATED AS THE RATIO OF THE TOTAL SYSTEM CAPACITY TO THE TOTAL CONNECTED LOAD.

F. ADJUST PATTERN ADJUSTMENT DEVICES IN DIFFUSERS FOR HORIZONTAL DISCHARGE, UNLESS OTHERWISE INDICATED ON THE

G. CALIBRATION OF BCS FLOW ELEMENTS SHALL BE VERIFIED THROUGH THE USE OF DUCT TRAVERSES OR FLOW HOODS, AS APPROPRIATE FOR THE DEVICE BEING CALIBRATED. BCS FLOW ELEMENTS SHALL NOT BE USED FOR BALANCE ADJUSTMENTS PRIOR TO THE VERIFICATION OF THEIR CALIBRATION. USE A 3-POINT CALIBRATION METHOD TO CALIBRATE TERMINAL UNITS. PERFORM 3-POINT CALIBRATION FOR AIRFLOW MEASUREMENT SYSTEMS THAT WILL EXPERIENCE VARIABLE FLOW, USING THE LOWER AND UPPER AIRFLOW LIMITS AS TWO OF THE CALIBRATION POINTS.

H. TEST. ADJUST AND BALANCE MINIMUM OUTSIDE AIR AND RETURN DAMPERS TO PRODUCE THE QUANTITY OF MINIMUM OUTSIDE AIR INDICATED ON THE DRAWINGS WHEN EACH AIR HANDLING UNIT IS OPERATING AT ITS MAXIMUM SUPPLY AIR QUANTITY. RETURN AIR DAMPERS SHALL BE ADJUSTED TO A LESS THAN FULLY OPEN POSITION ONLY IF REQUIRED TO ACHIEVE THE MINIMUM OUTSIDE AIR QUANTITY INDICATED ON THE DRAWINGS. RETURN AND MINIMUM OUTSIDE AIR DAMPER LINKAGES SHALL BE ADJUSTED TO POSITION THEIR RESPECTIVE DAMPERS AT FULL STROKE. PERMANENTLY MARK DAMPER LINKAGE ADJUSTMENTS. MEASURE, RECORD AND ADJUST THE OUTSIDE AIR BALANCING DAMPER SETPOINTS, INCLUDING ASSOCIATED LOWER AND UPPER LIMITS, AS NECESSARY TO ACHIEVE THE REQUIRED OUTSIDE AIR QUANTITY DESCRIBED IN THE AIR HANDLING UNIT CONTROLS SEQUENCES ON THE DRAWINGS. 5425 Page Road Durham, NC 27703 T 919 783-7812 Contact: Ben J. Smith N&B PROJECT: 21N297

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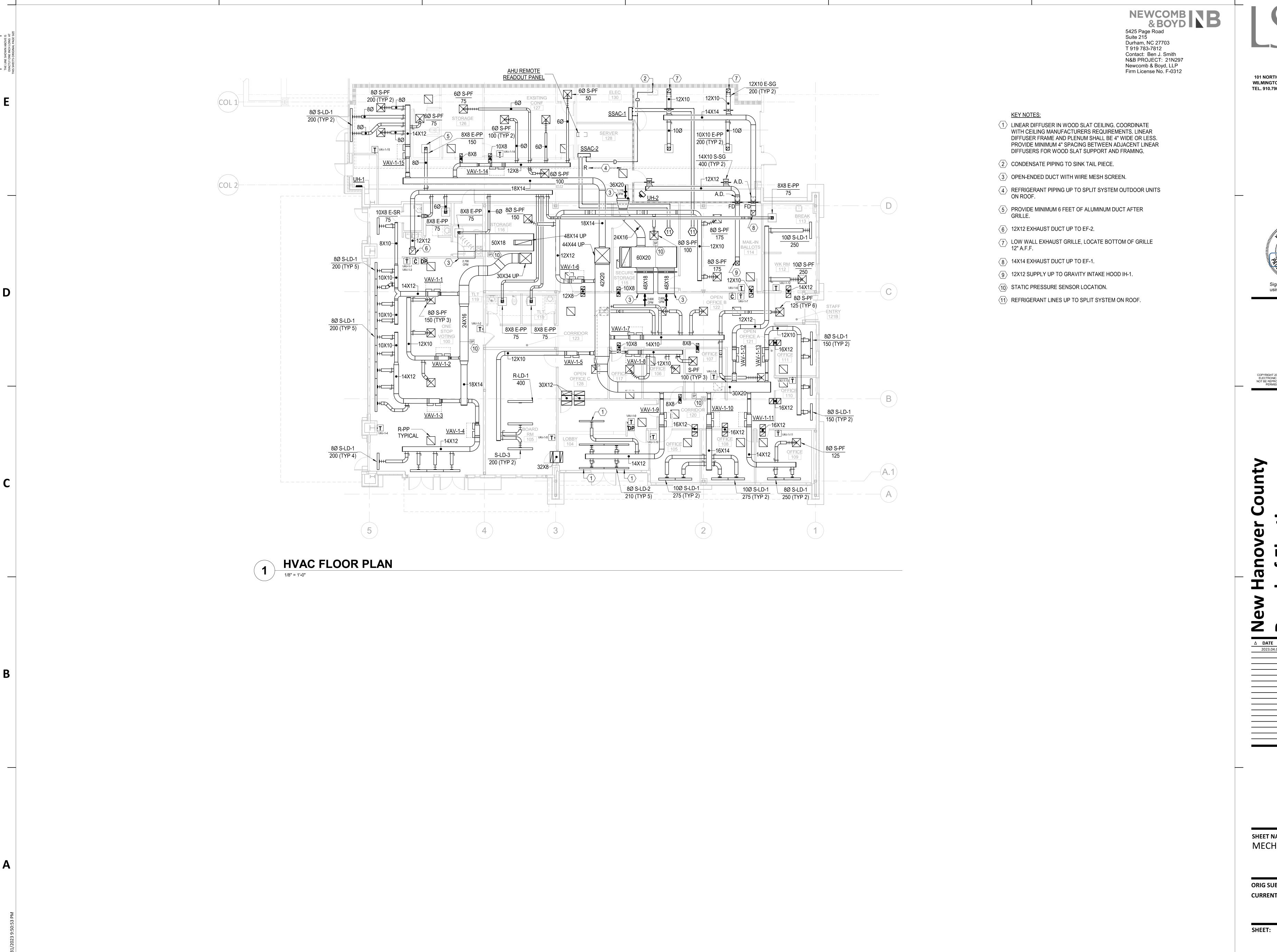
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**SHEET NAME: MECHANICAL** 

**GENERAL NOTES** 

**ORIG SUBMISSION: 2023.04.03 CURRENT:** 

M-002



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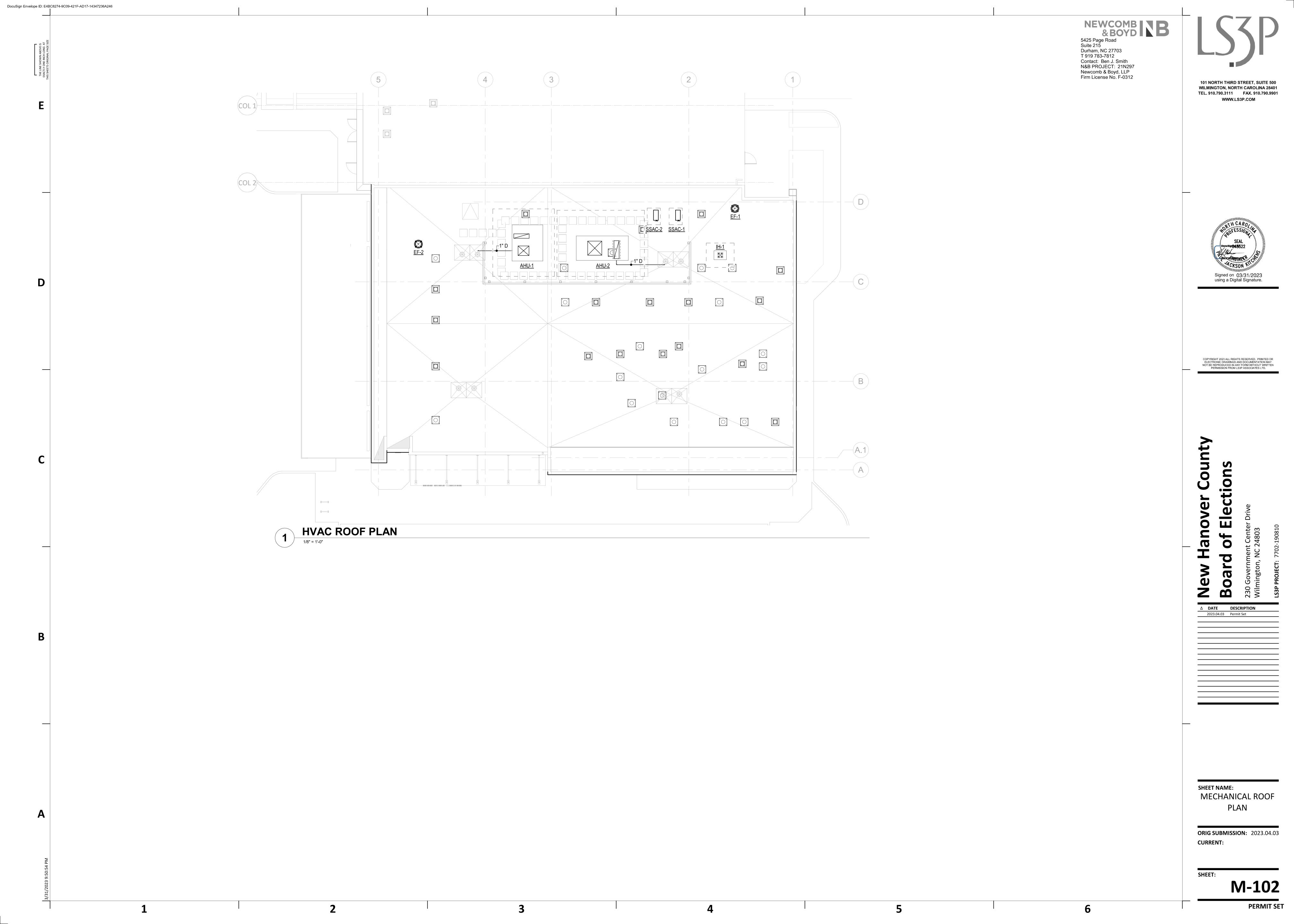
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**SHEET NAME:** MECHANICAL FLOOR PLAN

**ORIG SUBMISSION:** 2023.04.03 **CURRENT:** 

**M-101** 



1. DESIGN CONDITIONS:		
ii besion sombinisms.	<u>SUMMER</u>	WINTE
OUTSIDE	95.0°F DB, 78.0°F WB	15°F
ONE STOP VOTING	74°F DB, 50% RH	70°F
OPEN OFFICE	74°F DB, 50% RH	70°F
LOBBY	74°F DB, 50% RH	70°F
CONFERENCE ROOM	74°F DB, 50% RH	70°F
REMAINING SPACES	74°F DB, 50% RH	70°F

TYPE

(NOTE 1) | CFM | RPM | (NOTE 2) | IN. WG.

VOTING | 3,250 | 2,240 | FC-VV

OFFICES 7,300 1,730 FC-VV

ESP,

2. FAN TYPE:

FC FORWARD-CURVED AF AIRFOIL VV VARIABLE VOLUME

AREA SERVED

3. EXTERNAL STATIC PRESSURE DOES NOT INCLUDE UNIT CASING, UNIT-MOUNTED COOLING AND HEAT SECTION, OR UNIT-MOUNTED DAMPERS, BUT DOES INCLUDE FILTERS.

4. UNITS SHALL START AND OPERATE DOWN TO 0°F. CAPACITY IS BASED ON 105°F CONDENSER EAT.

5. ELECTRIC HEATING - SCR CONTROLLER

6. SERVICE: 208V, 3-PHASE, 60 Hz.

### AIR DISTRIBUTION SCHEDULE

### PRODUCT SPECIFICATIONS:

1. ACTION SUBMITTALS - PRODUCT DATA: FOR EACH TYPE OF PRODUCT.

a. DATA SHEET: INDICATE MATERIALS OF CONSTRUCTION, FINISH, AND MOUNTING DETAILS; AND PERFORMANCE DATA INCLUDING THROW AND DROP, STATIC-PRESSURE DROP, AND NOISE RATINGS. 2. SELECTION OF GRILLES, REGISTERS AND DIFFUSERS SHALL BE BASED ON AIR INTRODUCED AT A 20°F TEMPERATURE DIFFERENTIAL.

AIR HANDLING UNIT SCHEDULE

MINIMUM COIL EAT °F COIL LAT °F

COOLING SECTION (NOTE 4)

DB WB DB WB IEER

77.9 | 65.6 | 53.9 | 53.6

77.9 | 65.6 | 52.2 | 52.2

MINIMUM

18.8

OUTPUT

122.8

**HEATING SECTION (NOTE 5)** 

EAT °F

59.0

LAT °F

VIBRATION ISOLATION

TYPE DEFLECTION,

FS

FS

MIN. STATIC

0.75

0.75

NOTES

- 3. GRILLES AND REGISTERS WITH BORDERS SHALL HAVE FELT OR RUBBER GASKETS CEMENTED TO THE BACK FACE AND HOLDING SCREWS NOT OVER 18" ON CENTER AROUND THE PERIMETER.
- 4. WALL-MOUNTED GRILLES AND REGISTERS LOCATED LESS THAN 7' ABOVE FINISHED FLOOR SHALL BE HEAVY DUTY, IMPACT-RESISTANT TYPE.
- 5. DIFFUSERS IN LAY-IN CEILINGS SHALL LAY IN A NOMINAL 24" X 24"GRID OPENING AND SHALL BE FURNISHED WITHOUT EXPOSED FLANGES.
- 6. DIFFUSERS AND GRILLES IN LAY-IN CEILINGS WITH A NARROW TEE (SCREW SLOT) GRID SHALL HAVE A DROPPED FACE THAT LAYS FLUSH WITH ADJACENT CEILING TILES.

a. T-BAR SLOT DIFFUSERS SHALL HAVE SIDE MOUNTING CLIPS FOR MOUNTING AGAINST SIDE TEES.

7. INTERNAL PARTS OF DIFFUSERS SHALL BE DESIGNED SO THEY CAN BE ADJUSTED, REMOVED, AND ASSEMBLED WITHOUT SPECIAL TOOLS.

MINIMUM MAXIMUM OA, CFM

BRAKE HP

HP

- 8. DIFFUSERS SHALL HAVE ROUND NECKS OR SHALL BE PROVIDED WITH SQUARE-TO-ROUND COLLARS WHERE CONNECTED TO ROUND OR FLEXIBLE DUCT.
- 9. FINISHES, UNLESS OTHERWISE SPECIFIED HEREIN:
  - ALUMINUM GRILLES AND REGISTERS: WHITE BAKED ENAMEL. DIFFUSER FACES AND FRAMES: WHITE BAKED ENAMEL.
  - DIFFUSERS INTERIOR: SAME AS FACE AND FRAME
  - e. T-BAR SLOT DIFFUSERS INTERIORS: FLAT BLACK.
- 10. GRILLES, REGISTERS AND DIFFUSERS SHALL BE PROVIDED WITH FRAMES, BORDERS, AND MOUNTING ATTACHMENTS FOR INSTALLATION IN THE ACTUAL WALL, SOFFIT, AND CEILING CONSTRUCTION IN WHICH INSTALLED. 11. EXAMINATION
- EXAMINE AREAS WHERE DIFFUSERS ARE INSTALLED FOR COMPLIANCE WITH REQUIREMENTS FOR INSTALLATION TOLERANCES AND OTHER CONDITIONS AFFECTING PERFORMANCE OF EQUIPMENT. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

### 12. INSTALLATION

### a. INSTALL DIFFUSERS LEVEL AND PLUMB.

- OUTLETS AND INLETS: DRAWINGS INDICATE GENERAL ARRANGEMENT OF DUCTS, FITTINGS, AND ACCESSORIES. AIR OUTLET AND INLET LOCATIONS HAVE BEEN INDICATED TO ACHIEVE DESIGN REQUIREMENTS FOR AIR VOLUME, NOISE CRITERIA, AIRFLOW PATTERN, THROW, AND PRESSURE DROP. MAKE FINAL LOCATIONS WHERE INDICATED, AS MUCH AS PRACTICAL. FOR UNITS INSTALLED IN LAY-IN
- CEILING PANELS, LOCATE UNITS IN THE CENTER OF PANEL. WHERE ARCHITECTURAL FEATURES OR OTHER ITEMS CONFLICT WITH INSTALLATION, NOTIFY ARCHITECT FOR A DETERMINATION OF FINAL LOCATION. INSTALL DIFFUSERS WITH AIRTIGHT CONNECTIONS TO DUCTS AND TO ALLOW SERVICE AND MAINTENANCE OF DAMPERS, AIR EXTRACTORS, AND FIRE DAMPERS. INSULATE BACKPANS OF DIFFUSERS.
- d. INSTALL REGISTERS AND GRILLES WITH AIRTIGHT CONNECTIONS TO DUCTS AND TO ALLOW SERVICE AND MAINTENANCE OF DAMPERS, AIR EXTRACTORS, AND FIRE DAMPERS.
- 13. AFTER INSTALLATION. ADJUST DIFFUSERS TO AIR PATTERNS INDICATED. OR AS DIRECTED. BEFORE STARTING AIR BALANCING.

TYPE		•	CHARACTERISTICS	3		MANUFACTURER	DESCRIPTION
S-PF	<u>SIZE</u> 24" X 24" 24" X 24" 24" X 24"	NECK SIZE 10"Ø 8"Ø 6"Ø	<u>CFM</u> 226 - 300 0 - 225 0 - 75	  	NC LEVEL <25 <25 <25	NOTE 1	SQUARE PLATE FACE DIFFUSER TYPE WITH SINGLE SQUARE AIR DIFFUSION PANEL. DIFFUSERS SHALL HAVE AN 18" X 18" ALUMINUM FACE PANEL MOUNTED ON AN AERODYNAMICALLY SHAPED, ONE-PIECE, SEAMLESS 24" X 24" BACKPAN. EXPOSED SURFACES OF FACE PANELS SHALL BE SMOOTH, FLAT, AND FREE OF VISIBLE FASTENERS.
S-SG	<u>FACE SIZE</u> 14" X 10"	NECK SIZE -	<u>CFM</u> 225 - 400	===	NC LEVEL <25	NOTE 1	SIDEWALL REGISTER, SINGLE DEFLECTION, 45 DEG. FIXED POSITION, 0.5" ON CENTER, HORIZONTAL BLADES. ALUMINUM CONSTRUCTION.
E-SG	<u>FACE SIZE</u> 12" X 8"	NECK SIZE	<u>CFM</u> 125 - 200		NC LEVEL <25	NOTE 1	SIDEWALL REGISTER, SINGLE DEFLECTION, 45 DEG. FIXED POSITION, 0.5" ON CENTER, HORIZONTAL BLADES. ALUMINUM CONSTRUCTION.
E-SR	<u>FACE SIZE</u> 10" X 8"	NECK SIZE -	<u>CFM</u> 0 - 125		NC LEVEL <25	NOTE 1	SIDEWALL REGISTER, SINGLE DEFLECTION, 45 DEG. FIXED POSITION, 0.5" ON CENTER, HORIZONTAL BLADES. ALUMINUM CONSTRUCTION.
S-LD-1 S-LD-2 S-LD-3	NUMBER OF SLOTS 2 2 2 2	<u>SLOT</u> <u>WIDTH</u> 1.5" 0.75" 1.5"	CFM / FT 0 - 76 0 - 60 0 - 60	<u>LENGTH</u> 4'-0" 6'-0" 6'-0"	NC LEVEL  <25 <25 <25 <25	NOTE 1	T-BAR SLOT DIFFUSER, ALUMINUM PLENUM WITH ROUND NECK OPENING, ADJUSTABLE AIR PATTERN CONTROLLERS, AND EXTERNAL INSULATION. PATTERN CONTROLLER SHALL BE LOCATED BELOW THE BOTTOM OF THE NECK OPENING IN POSITION INCLUDING THE VERTICAL POSITION. SELF-LOCKING NUTS SHALL BE ADJUSTED PRIOR TO INSTALLATION IN THE CEILING SUCH THAT THE AIR PATTERN WILL REMAIN IN ANY SETTING MADE THROUGH THE FACE OF THE SLOT. DIFFUSERS SHALL HAVE CROSS NOTCHES TO ACCOMMODATE THE CEILING GRID WHERE REQUIRED.
R-LD-1	NUMBER OF SLOTS 2	SLOT WIDTH 1.5"	<u>CFM / FT</u> 0 - 100	<u>LENGTH</u> 6'-0"	NC LEVEL <25	NOTE 1	T-BAR SLOT RETURN DIFFUSER - ALUMINUM. DIFFUSERS SHALL HAVE CROSS NOTCHES TO ACCOMMODATE THE CEILING GRID WHERE REQUIRED.
R-PP	<u>SIZE</u> 24" X 24"	NECK SIZE -	<u>CFM</u> 0 - 500	<u></u> 	NC LEVEL <25	NOTE 1	PERFORATED ALUMINUM PLATE RETURN GRILLE. PROVIDE NECK MOUNTED RETURN SOUND ABSORBING BAFFLES SIMILAR TO PRICE INDUSTRIES THIN LINE RETURN DISSIPATOR.
E-PP	<u>SIZE</u> 24" X 24" 24" X 24"	NECK SIZE 8"Ø 10"Ø	<u>CFM</u> 0 - 125 125 - 200	=== 	NC LEVEL <25 <25	NOTE 1	PERFORATED ALUMINUM PLATE EXHAUST GRILLE. PROVIDE RECTANGULAR TO ROUND TRANSITION.

1. MANUFACTURER: NAILOR, PRICE INDUSTRIES, OR TITUS

TERMINAL UNIT SCHEDULE								
		F	PRIMARY CF	M	ELECTRIC	HEATING COIL	IL	
	TYPE	COOLING		HEATING	KW			
NO.	(NOTE 1)	MAXIMUM	MINIMUM	MAXIMUM	(NOTE 2)	STEPS	NOTES	
VAV-1-1	VV-R-D	1,000	200	500	5	SCR		
VAV-1-2	VV-R	450	135	135	1.5	SCR		
VAV-1-3	VV-R-D	1,000	200	500	5	SCR		
VAV-1-4	VV-R-D	800	160	400	4	SCR		
VAV-1-5	VV-R	400	120	120	1.5	SCR		
VAV-1-6	VV-R	600	180	180	2	SCR		
VAV-1-7	VV-R	750	225	225	2.5	SCR		
VAV-1-8	VV-R	300	90	90	1	SCR		
VAV-1-9	VV-R-D	1,050	210	525	5	SCR		
VAV-1-10	VV-R-D	1,100	220	550	5.5	SCR		
VAV-1-11	VV-R-D	625	125	315	3	SCR		
VAV-1-12	VV-R	500	150	150	1.5	SCR		
VAV-1-13	VV-R-D	600	120	300	3	SCR		
VAV-1-14	VV-R-D	425	85	215	2.5	SCR		
VAV-1-15	VV-R-D	875	175	440	4.5	SCR		

R-D DUAL MAX REHEAT

OCTAVE BAND

5. REFER TO THE ELECTRICAL DRAWINGS FOR THE EQUIPMENT ELECTRICAL CHARACTERISTICS.

ARE CONFIGURED DIFFERENTLY, THE ACCESS REQUIREMENTS SHALL BE ADJUSTED IN THE FIELD.

IN dB @ 10 pW, SHALL BE WITHIN THE AHRI 880-2011 ADDENDUM 1 TOLERANCES OF THE FOLLOWING LEVELS:

3. SEE SPECIFICATIONS FOR AHRI TESTING/CERTIFICATION REQUIREMENTS AND SUPPLEMENTAL SOUND ATTENUATION REQUIREMENTS.

LEVELS BASED ON MAXIMUM PRIMARY CFM AND MINIMUM DIFFERENTIAL STATIC PRESSURE OF 1" WG FOR VV AND CV UNITS.

MINIMUM | SENSIBLE

1/25 9,250

3. DUCTLESS SPLIT SYSTEM SHALL BE A STAND-ALONE SYSTEM WITH LOCAL SPACE TEMPERATURE SENSOR. DUCTLESS SPLIT SYSTEM

FAN SCHEDULE

800

HP

1/25

4. DIFFERENTIAL STATIC PRESSURE DROP ACROSS COMPLETE ASSEMBLY, INCLUDING HEATING COIL, FOR ALL UNITS SHALL NOT EXCEED 0.3" WG APD.

SPLIT SYSTEM AIR CONDITIONING UNIT SCHEDULE

MBH

9,250

6. THE DRAWINGS INDICATE THE DESIGN INTENT TO PROVIDE ACCESS TO HEATING COILS, CONTROL PANELS, AND ACCESS DOORS. IF TERMINAL UNITS PROVIDED

COOLING

MBH

12,000

12,000

MAX RPM

1,725

1,725

0.25

0.33

0.25

0.26

EER

13

INDOOR UNIT | MOTOR | CAPACITY, | CAPACITY, | MINIMUM | REQUIRED CIRCUIT

MAXIMUM

CONDENSING UNIT

1-4

FOR TERMINAL UNITS WHERE THE SOUND POWER LEVEL FIELDS OF THE SCHEDULE ABOVE ARE LEFT BLANK, THE MAXIMUM ALLOWABLE SOUND POWER LEVELS

VV VARIABLE VOLUME - R REHEAT

DISCHARGE, LESS THAN 900 CFM 66

AREA SERVED | NOMINAL CFM |

1. PROVIDE CONDENSATE PUMP FOR EACH INDOOR UNIT.

2. OUTDOOR UNIT SHALL BE PROVIDED WITH LOW AMBIENT WIND.

320

CONTROLLER SHALL BE PROVIDED WITH RELAY TO BMS FOR SYSTEM MONITORING.

4. REFER TO THE ELECTRICAL DRAWINGS FOR EQUIPMENT ELECTRICAL CHARACTERISTICS

TYPE NOMINAL CAPACITY, kW NOTES

(NOTE 1) CFM (NOTE 2)

**ELECTRIC UNIT HEATER** 

3. REFER TO THE ELECTRICAL DRAWINGS FOR EQUIPMENT ELECTRICAL

DISCHARGE, 900 CFM OR MORE

2. CAPACITY BASED ON 55°F EAT FOR VV-R UNITS.

CASING RADIATED

SSAC-1 | ELECTRICAL 122

SSAC-2 SERVER 120

UH-1 FIRE RISER

C CEILING MOUNTED

2. BASED ON 60°F EAT

CHARACTERISTICS

1. TYPE:

NO.

EF-1

EF-2

W WALL

UH-2 UTILITY YARD C

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# ounty

Δ **DATE DESCRIPTION** 

**SHEET NAME: MECHANICAL SCHEDULES** 

**ORIG SUBMISSION:** 2023.04.03 **CURRENT:** 

SHEET:

**M-200** 

**PERMIT SET** 

1. TYPE: C CENTRIFUGAL

DRIVE: D DIRECT

3. REFER TO THE ELECTRICAL DRAWINGS FOR EQUIPMENT ELECTRICAL

AREA SERVED

TOILETS

LANDSCAPING STORAGE

CHARACTERISTICS

	INTAKE HOOD SCHEDULE							
NO.	AREA SERVED	TYPE (NOTE 1)	MINIMUM THROAT AREA, SQFT	MAXIMUM FLOW, CFM	NOMINAL HOOD SIZE, IN X IN	NOMINAL HEIGHT, IN	MAXIMUM APD, IN WG (NOTE 2)	NOTES
IH-1	LANDSCAPE STORAGE	GRV-I	2	800	39X28	28	0.01	3, 4, 5

1.18

NOTES: 1. TYPE: GRV GRAVITY ROOF VENTILATOR

I - INTAKE

2. THE STATIC AIR PRESSURE DROP THROUGH THE HOOD AT SCHEDULED CFM.

3. PROVIDE BIRD SCREEN AND FULL ALUMINUM CONSTRUCTION. 4. PROVIDE ROOF CURB - MINIMUM 24".

5. BIRD SCREEN SHALL BE ROOF ACCESSIBLE.

1" LINING -

MAKE WIDTH AS

REQUIRED FOR

LINEAR DIFFUSER, SEE

DRAWINGS FOR SIZE -

OTHER UTILITIES.

DIFFUSER

PLENÚM

1. NECK AND PLENUM LENGTH SHALL BE DETERMINED BY ACTIVE DIFFUSER LENGTH.

MOUNTING CONDITIONS. SEE ARCHITECTURAL DRAWINGS.

4. SEE DRAWINGS FOR SPECIAL PLENUM SIZES.

LINEAR DIFFUSERS

2. DIFFUSER MOUNTING FRAME SHALL BE DETERMINED BY CEILING CONSTRUCTION AND

3. TRANSITION AND/OR ADJUST PLENUM DIMENSIONS TO COORDINATE WITH STRUCTURE OR

SUPPLY

DUCT

- SPIN-IN (IF FLEXIBLE

DUCT IS USED)

—3" MINIMUM

-2" MINIMUM

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> △ DATE DESCRIPTION 2023.04.03 Permit Set

**SHEET NAME:** MECHANICAL DETAILS

**ORIG SUBMISSION:** 2023.04.03 **CURRENT:** 

SHEET:

**M-300** 

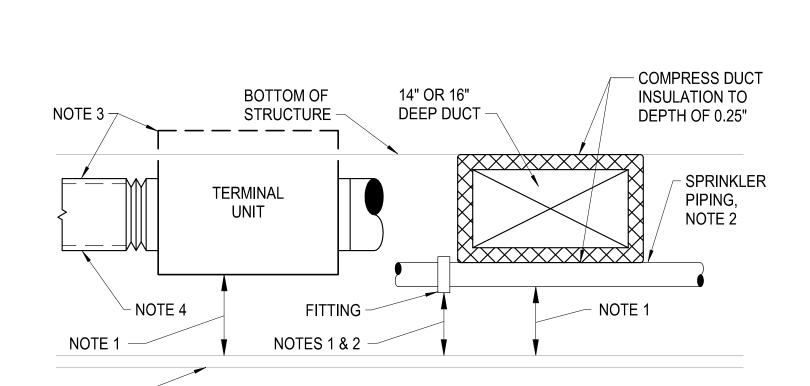
6" MINIMUM -— 1" LINING 0.5X MINIMUM

**3X MINIMUM** 

NOTES:

1. SEAL WALL PENETRATION AIRTIGHT. DUCTS SHALL BE MINIMUM 22 GAUGE SHEET METAL.
 SEE FLOOR PLANS FOR DUCT SIZES.

TRANSFER DUCTS

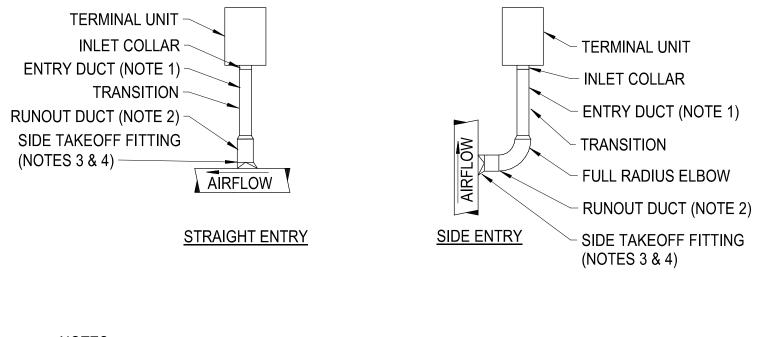


NOTES:

1. MAINTAIN MINIMUM 7" HIGH CLEARANCE FROM BOTTOM OF CEILING FOR LUMINAIRES. 2. DO NOT LOCATE SPRINKLER PIPE FITTINGS UNDER DUCTWORK, DUCTWORK FLANGES, OR TERMINAL UNITS UNLESS 7" CLEARANCE CAN BE MAINTAINED. 3. OFFSET TERMINAL UNITS AND CONNECTING DUCTWORK UP INTO STRUCTURE OR BETWEEN JOISTS TO MAINTAIN 7" CLEARANCE WHERE UNITS HAVE A DEPTH GREATER THAN 16".

4. OFFSET DUCTWORK AND RUNOUTS TO PASS BETWEEN LUMINAIRES TALLER THAN 6.75". 5. OFFSET PIPING, DUCTWORK AND EQUIPMENT TO ACCOMMODATE CEILING COVES AND FRAMING.

**DUCTWORK INSTALLATION AND COORDINATION 5**NTS



1. ENTRY DUCT SHALL MATCH INLET COLLAR SIZE, BE INDEPENDENTLY SUPPORTED FROM THE TERMINAL UNIT, AND HAVE A TOTAL LENGTH THAT IS 3 TIMES THE DIAMETER OR WIDTH OF THE INLET COLLAR SIZE.

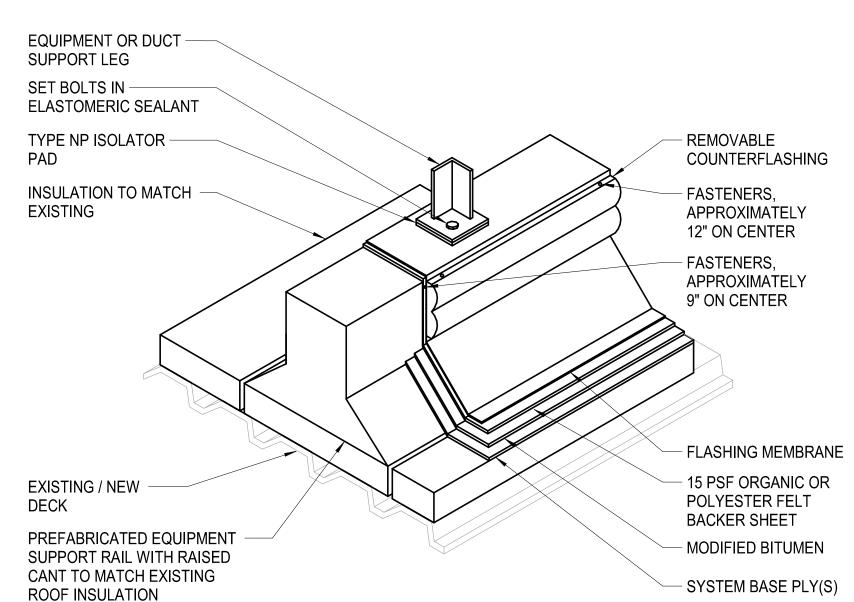
2. THE RUNOUT FROM THE PRIMARY DUCT TO THE ENTRY DUCT SHALL BE SIZED AS FOLLOWS UNLESS NOTED OTHERWISE ON THE DRAWINGS.

INLET COLLAR AND ENTRY DUCT SIZES	RUNOUT FROM PRIMARY TO ENTRY DUCT
6"ø	10"ø
8"ø	12"ø
10"ø	14"ø
12"ø	16"ø

3. FOR ROUND TAKEOFF CONNECTIONS TO ROUND OR FLAT OVAL PRIMARY SUPPLY DUCTS, PROVIDE A CONICAL TAP IN LIEU OF A SIDE TAKEOFF FITTING.

4. FOR AIR HANDLING SYSTEMS WHERE THE PRIMARY SUPPLY DUCT DISTRIBUTION IS PROVIDE A CONICAL TAP IN LIEU OF A SIDE TAKEOFF FITTING. FITTINGS SHALL BE CONCENTRIC TYPE.





4 EQUIPMENT SUPPORT RAILS

VV TYPE TERMINAL UNIT CONTROLLER TERMINAL UNIT PRIMARY AIR FLOW PRIMARY AIR VALVE CONTROL SPACE TEMPERATURE DISCHARGE AIR TEMPERATURE |X| |X|X|COOLING SETPOINT ADJUST

1. FAILURE MODE: O - ON OR OPEN, C - OFF OR CLOSE, L - LAST COMMAND

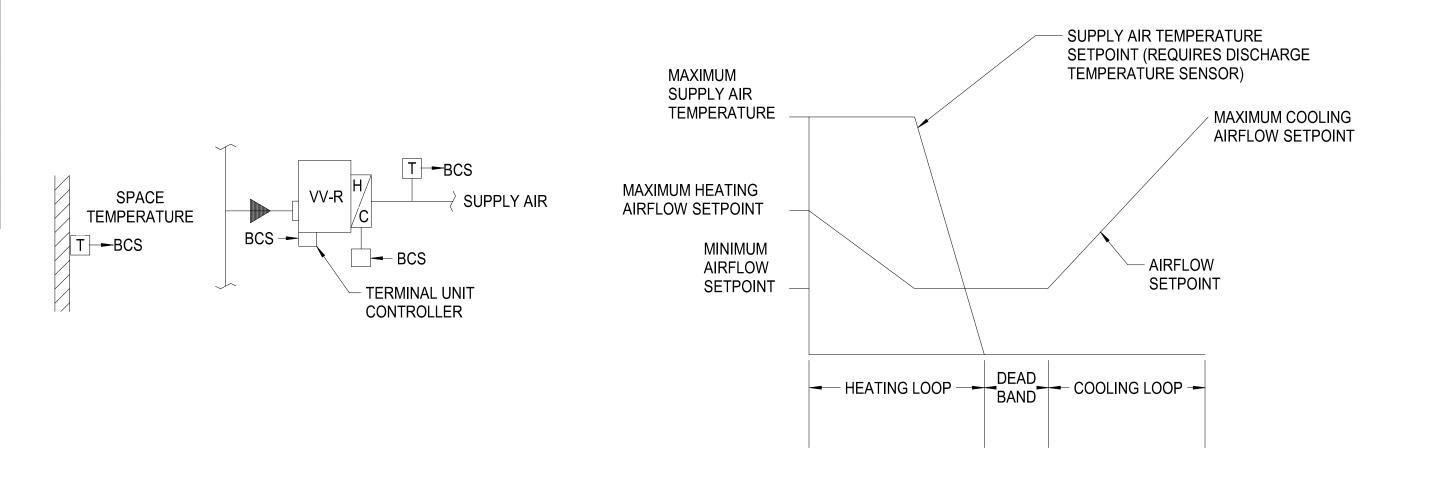
2. TERMINAL UNIT CONTROLS AND INTERFACES SHALL BE ARRANGED SO THAT EQUIPMENT CONTROLLED BY THE BCS OPERATES

AS INDICATED ON FAILURE OF THE TERMINAL UNIT CONTROLLER FOR ANY REASON, INCLUDING LOGIC POWER SUPPLY FAILURE, CPU LOCK-UP, OR INTERPOSING RELAY FAILURE. SAFETY AND OPERATIONAL INTERLOCKS SHALL REMAIN IN EFFECT.

3. PROVIDE TERMINAL UNIT BCS CONTROLLER WITH IDENTICAL CONTROL POINTS AND FUNCTIONS FOR EACH TERMINAL UNIT.

# CONTROLS - TERMINAL UNIT WITH ELECTRIC REHEAT

- TERMINAL UNIT CONTROLLER SHALL MODULATE THE PRIMARY AIR VALVE TO MAINTAIN THE MINIMUM HEATING FLOW AND MODULATE THE ELECTRIC HEATING COIL TO MAINTAIN LEAVING AIR TEMPERATURE SETPOINT
- 3. LEAVING AIR TEMPERATURE SETPOINT SHALL BE VARIED TO MAINTAIN SPACE TEMPERATURE SETPOINT BETWEEN THE LIMITS OF THE AIR HANDLING UNIT SYSTEM DISCHARGE AIR TEMPERATURE SETPOINT AND 20°F ABOVE THE HEATING SPACE TEMPERATURE
- 4. ON A FURTHER DROP IN SPACE TEMPERATURE, THE TERMINAL UNIT CONTROLLER SHALL MODULATE THE PRIMARY VALVE OPEN TO THE MAXIMUM HEATING FLOW TO MAINTAIN THE HEATING SPACE TEMPERATURE SETPOINT WHILE SIMULTANEOUSLY MODULATING THE ELECTRIC HEATING COIL TO MAINTAIN THE LEAVING AIR TEMPERATURE AT 20°F ABOVE THE HEATING SPACE TEMPERATURE



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Newcomb & Boyd, LLP

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**PERMIT SET** 

M-400

**INPUTS** OUTPUTS SOFTWARE **SEQUENCE OF OPERATIONS BCS PANEL** ANALOG ALARM BCS ENERGY MGMT. DIGITAL ANALOG DIGITAL INPUT/OUTPUT THE CONTROLS FOR FAN EF-2 SHALL FUNCTION AS FOLLOWS: SUMMARY 1. THE FAN SHALL BE AUTOMATICALLY STARTED AND STOPPED BY THE BCS Firm License No. F-0312 **FANS** CONTROLLER WHENEVER THE HAND-OFF-AUTOMATIC SWITCH IS IN THE AUTOMATIC POSITION, AND MANUALLY STARTED AND STOPPED BY THE HAND POSITION. 2. THE FAN SHALL RUN CONTINUOUSLY DURING OCCUPIED HOURS. 3. THE MOTORIZED DISCHARGE DAMPER SHALL OPEN WHEN THE FAN IS ON AND CLOSE WHEN THE FAN IS OFF. DISCHARGE DAMPER SEQUENCE OF OPERATIONS THE CONTROLS FOR FAN EF-1 AND IH-1 SHALL FUNCTION AS FOLLOWS: FANS CONTROLLED BY TIME SWITCHES FAN EF-2 1. THE FAN SHALL BE AUTOMATICALLY STARTED AND STOPPED BY THE BCS START/STOP CONTROLLER WHENEVER THE HAND-OFF-AUTOMATIC SWITCH IS IN THE AUTOMATIC STATUS POSITION, AND MANUALLY STARTED AND STOPPED BY THE HAND POSITION. BCS <del>\\\\\\</del> FANS RUNNING CONTINUOUSLY 2. THE FAN SHALL RUN CONTINUOUSLY. FAN EF-1 DISCHARGE START/STOP 3. THE MOTORIZED DISCHARGE DAMPER ASSOCIATED WITH EF-1 SHALL OPEN WHEN DAMPER THE FAN IS ON AND CLOSE WHEN THE FAN IS OFF. ADDITIONALLY THE INTAKE STATUS ISOLATION DAMPER ASSOCIATED IH-1 SHALL OPEN WHEN THE FAN IS ON AND CLOSE WHEN THE FAN IS OFF. FANS RUNNING CONTINUOUSLY GRAVITY INTAKE HOOD IH-1 DAMPER OPEN/CLOSE STATUS <u>NOTES:</u> 1. FAILURE MODE O - ON OR OPEN C - OFF OR CLOSE L - LAST COMMAND 2. WHERE FAILURE MODE IS INDICATED, THE INDICATED POSITION SHALL OCCUR ON INTERRUPTION OF ELECTRIC POWER TO THE BCS PANEL. 3. PROVIDE IDENTICAL BCS CONTROL POINTS AND FUNCTIONS FOR EACH IDENTICAL PIECE OF EQUIPMENT. **CONTROL - GENERAL EXHAUST** 

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SHEET:

M-401