

Apr 09, 2024 - 1:30pm - rd  
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HVAC SPECIFICATION

- QUALITY ASSURANCE: COMPLY WITH THE CURRENT:
- INTERNATIONAL MECHANICAL (IMC), BUILDING CODE (IBC), ENERGY CODE (IECC); LOCAL CODES AND AMMENDMENTS
  - NFPA 70, UL LISTING, NFPA 90A & 90.
  - MANUFACTURERS: PROVIDE PRODUCTS OF THE BASIS OF DESIGN MANUFACTURER AND MODEL LISTED ON THE SCHEDULES OR SPECIFICATION OR ALTERNATES SUBJECT TO COMPLIANCE WITH SPECIFIED CHARACTERISTICS AND/OR PERFORMANCE.

- SUBMITTALS:
- PRODUCT DATA FOR HEATING AND COOLING UNITS AND FANS PLUS CONTROL SHOP DRAWINGS AND PRODUCT DATA.
  - WARRANTIES AND GUARANTEES
  - OWNERS OPERATIONAL AND MAINTENANCE MANUALS.
  - BALANCING AND COMMISSIONING REPORTS: SUBMIT PRE-TEST VERIFICATION AND BALANCING DATA REPORTS PLUS COMMISSIONING REPORTS PER 2018 IECC.
  - COORDINATION DRAWINGS: DIMENSIONED PLANS SHOWING REQUIRED CLEARANCE AND ACCESS, FULLY COORDINATED WITH WORK OF OTHER TRADES.
  - RECORD DRAWINGS: DELIVER TO OWNER AT THE COMPLETION OF THE PROJECT A SET OF PRINTS OF THE DRAWINGS MARKED IN RED SHOWING CHANGES IN LOCATIONS, MODELS, AND CAPACITIES OF COMPONENTS.

- PIPING AND INSULATION:
- GENERAL: PROVIDE STEEL PIPE SLEEVES FOR MASONRY WALL PENETRATIONS, TIGHT FITTING SHEET METAL SLEEVES IN WOOD PENETRATIONS AND 3M FIRE STOPPING IN RATED WALL OR FLOOR PENETRATIONS. PROVIDE DIELECTRIC FITTINGS OR UNIONS IN ALL PIPE CONNECTIONS OF DISSIMILAR METALS.
  - COOLING COIL CONDENSATE: RUN IN PVC PIPING AND SOLVENT WELDED JOINTS EXCEPT PLENUM AREAS RUN IN TYPE L RIGID COPPER TUBING WITH SOLDERED WROUGHT COPPER FITTINGS. INSULATE WITH 1/2" CLOSED CELL FOAM (ARMAFLEX).
  - REFRIGERANT PIPING SHALL BE DRAWN AND ANNEALED (MAX. O.D. 0.625") ACR COPPER TUBE WITH WROUGHT COPPER FITTINGS. INSULATE WITH CLOSED CELL FOAM (AP ARMAFLEX FS OR EQUAL), 1" THICK FOR 1.5" AND LARGER PIPES, 0.5" THICK FOR SMALLER PIPES. SEAL INSULATION JOINTS WITH MASTIC VAPOR TIGHT. BRAZE WITH INERT GAS PROTECTION, CHARGE WITH NITROGEN & EVACUATE TO 200 MICRONS OR LESS IN MULTIPLE CYCLES AS RECOMMENDED BY EQUIPMENT MANUFACTURER.

- HANGERS AND SUPPORTS:
- PROVIDE CLEVIS HANGERS SIZED TO INCLUDE INSULATION WITH INSULATION SHIELDS.
  - PROVIDE JOIST HANGERS AND ALL-THREAD RODS.
  - FOR ROOF PIPE PENETRATIONS, PROVIDE RUBBER BOOT PIPE PORTALS AND CURB ASSEMBLY FOR MULTIPLE PIPES BY PATE OR EQUAL.
  - FOR SPLIT SYSTEM CONDENSING UNITS ABOVE ROOF (UP TO 5 TONS), PROVIDE HOT DIPPED GALVANIZED STEEL PANS ON POLYCARBONATE BASES WITH ADJUSTABLE STAINLESS STEEL THREADED RODS AND HARDWARE BY MIRO OR SIMILAR.
  - INSTALL SUPPORTS FOR VERTICAL COPPER TUBING EVERY 10 FEET AND INSTALL HANGERS FOR HORIZONTAL TUBING WITH THE FOLLOWING MAXIMUM SPACING AND MINIMUM ROD DIAMETERS:
    - NPS 3/4" & SMALLER: 60" SPAN & 3/8" ROD, NPS 1" & 1.25": 72" SPAN & 3/4" ROD, NPS 1.5" & 2": 96" SPAN & 3/8" ROD, NPS 2-1/2": 108" SPAN & 1/2" ROD, NPS 3" TO 5": 120" SPAN 1/2" ROD.

- IDENTIFICATION:
- GENERAL: PROVIDE PERMANENT LABELS ON ALL EQUIPMENT WITH DRAWING TAG, CAPACITY, AND ELECTRICAL CHARACTERISTICS.
  - OUTDOOR EQUIPMENT: PROVIDE STAMPED METAL NAMEPLATES.

- ELECTRICAL REQUIREMENTS:
- GENERAL: PROVIDE STARTERS, VARIABLE SPEED DRIVES, TRANSFORMERS, RELAYS, 120V POWER FOR ACTUATORS, SWITCHES, DISCONNECTS, AND CONTROLS AS LISTED BELOW FOR A COMPLETE SYSTEM. FOLLOW THE REQUIREMENTS OF THE ELECTRICAL SECTION OF THE SPECIFICATION.
  - UNIT MOUNTED RECEPTACLES: PROVIDE RECEPTACLES ON ROOFTOP EQUIPMENT WITH 120V TRANSFORMER AND DISCONNECT FROM UNIT POWER FEED AHEAD OF UNIT DISCONNECT.
  - MOTORS: PROVIDE MOTORS FOR MECHANICAL EQUIPMENT SUPPLIED BY THE EQUIPMENT MANUFACTURER WHEN POSSIBLE. PROVIDE MOTORS OF PHASE AND VOLTAGE INDICATED ON DRAWINGS AND SUITABLE FOR THE LOADING AND ENVIRONMENT. PROVIDE OPEN DRIP PROOF (ODP) MOTOR ENCLOSURES FOR NORMAL USE OR TOTALLY ENCLOSED FAN COOLED (TEFC) ENCLOSURES FOR OUTDOOR USE, HAZARDOUS OR DIRTY ENVIRONMENTS. PROVIDE MOTORS WITH 1.15 SERVICE FACTOR, INSULATION CLASS F, AND PRE-LUBRICATED BALL BEARINGS RATED FOR CONTINUOUS DUTY UP TO 105°F AMBIENT TEMPERATURE AND 3000FT ALTITUDE. POLY-PHASE MOTORS SHALL BE PREMIUM EFFICIENCY AND WHEN USED WITH VARIABLE SPEED DRIVES, SHALL BE RATED FOR INVERTER DUTY. SINGLE PHASE MOTORS LARGER THAN 1½HP SHALL BE OPEN-CAPACITOR START, CAPACITOR RUN TYPE UNLESS OTHERWISE INDICATED. SINGLE PHASE MOTORS 1½HP AND SMALLER MAY BE SPLIT PHASE START, CAPACITOR RUN TYPE OR PERMANENT-SPLIT CAPACITOR TYPE.
  - STARTERS: PROVIDE EACH MOTOR WITH A MOTOR STARTER OF PROPER DESIGN TO MEET THE REQUIREMENTS OF THE MOTOR AND DRIVE. STARTER TYPES SHALL INCLUDE MAGNETIC, MANUAL, SOLID-STATE REDUCED VOLTAGE, OR VARIABLE SPEED DRIVE. COORDINATE STARTER REQUIREMENTS WITH THE EQUIPMENT AND CONTROL SEQUENCE. PROVIDE ACCESSORIES SUCH AS CONTACTS, OVERLOADS, EXTERNAL RESETS, CONTROL CIRCUIT TRANSFORMERS, PILOT LIGHTS, PUSH BUTTONS, HOA AND OTHER SELECTOR SWITCHES AS NEEDED FOR THE SPECIFIED OPERATION.

- HEAT PUMP SPLIT SYSTEM:
- INDOOR UNIT: WALL MOUNTED TYPE, SPLIT SYSTEM LOW AMBIENT OPERATION FOR HEATING AND COOLING, DIRECT EXPANSION (DX) COIL WITH COPPER TUBES EXPANDED INTO ALUMINIUM FINS, DRAIN PAN AND PUMP, ELECTRONIC EXPANSION VALVE, CENTRIFUGAL MULTI-SPEED DIRECT DRIVE FAN WITH THERMAL PROTECTION, TIME DELAY RELAY, IMPACT RESISTANT, AND WASHABLE DECORATION PANEL.
  - OUTDOOR UNIT: PROVIDE HIGH EFFICIENCY SPLIT SYSTEM CONDENSING UNIT WITH SCROLL COMPRESSOR(S) MODEL AND CAPACITY AS SCHEDULED.

- PACKAGED HEATING AND COOLING ROOFTOP UNIT:
- FURNISH AND INSTALL HEATING/COOLING SYSTEMS, SELF CONTAINED, FULLY CHARGED, FACTORY ASSEMBLED, PACKAGED DDC CONTROLS WITH BACNET BAS INTERFACE, WIRED AND TESTED UNITS WITH VERTICAL DISCHARGE AIRFLOW.
  - PROVIDE CAPACITY, PERFORMANCE, STAGES, AND OPTIONS LISTED ON THE DRAWING SCHEDULE.
  - ALL UNITS SHALL BE FACTORY ASSEMBLED, PIPED, INTERNALLY WIRED AND FULLY CHARGED WITH REFRIGERANT.
  - ALL UNITS SHALL BE DESIGNED TO OPERATE AT OUTDOOR AMBIENT TEMPERATURES FROM -20°F TO 120°F.
  - UNIT SHALL BE TESTED IN COMPLIANCE WITH ANSI/ AHRI 340/360, ANSI/ ASHRAE 37, AHRI 270/370 STANDARDS.
  - PROVIDE 5-YR NON-PRORATED PARTS WARRANTY FOR ENTIRE UNIT.
  - CABINET: SHALL BE WEATHERPROOFED DOUBLE-WALL G90 GALVANIZED STEEL AND DESIGNED FOR OUTDOOR ROOFTOP INSTALLATION AND ASSEMBLED WITH STRUCTURAL POP-RIVETS AND CNC BENT COMPONENTS. ROOF SHALL HAVE DOUBLE-STANDING, SELF-LOCKING SEAM THAT IS SELF-SUPPORTING AND PITCHED FOR DRAINAGE. WALLS SHALL BE DOUBLE-WALL G90 GALV. STEEL WITH 1"-R4.3 INSULATION UP TO 2000 CFM OR 2"-R13 CLOSED CELL FOAM FOR LARGER UNITS. EXTERIOR SURFACES OF ALL UNITS SHALL BE PHOSPHATIZED, ZINC-COATED STEEL WITH EPOXY RESIN PRIMER AND BAKED ENAMEL FINISH PASSING 24HR ASTM B 117 SALT SPRAY TEST.
  - PROVIDE HAIL GUARDS ON CONDENSER COILS.
  - SERVICE ACCESS DOORS: DOUBLE-WALL INSULATED CONSTRUCTION WITH DOOR JAMBS SHALL BE GASKETED AROUND THEIR PERIMETER, AND ALLOW FOR DOORS TO BE MOUNTED VIA REMOVABLE, SPRING ACTUATED, STAINLESS STEEL HINGES WITH STAINLESS STEEL RIVETS, AND SELF-COMPRESSING LATCHES. EACH COMPARTMENT SHALL HAVE REMOVABLE ACCESS PANELS TO ALLOW FOR EASE OF SERVICE AND MAINTAINABILITY. ELECTRICAL CABINET ACCESS DOORS SHALL HAVE A DOOR HOLD INSTALLED TO PROP DOORS OPEN; ALL DOORS SHALL HAVE STAINLESS STEEL LATCHES WHICH ARE PAD LOCKABLE. ELECTRICAL CABINET DOORS SHALL BE OUTFITTED WITH SCHEMATIC/MANUAL POUCHES FORMED INTO THE DOOR, ALONG WITH WIRING DIAGRAM ATTACHED TO THE INDOOR OF THE DOOR FROM THE FACTORY. DOOR FASTENING SCREWS ARE NOT ACCEPTABLE.
  - ALL OPENINGS THROUGH THE BASE PAN OF THE UNIT SHALL HAVE UPTURNED FLANGES OF AT LEAST ½" IN HEIGHT AROUND THE OPENING THROUGH THE BASE PAN.
  - SUPPLY FANS: DYNAMICALLY BALANCED DIRECT DRIVE BLOWER(S) WITH PREMIUM EFFICIENCY MOTORS AND TOTAL CFM MONITORING AT FAN DISCHARGE.
  - PROVIDE VARIABLE-SPEED INVERTER DUTY SCROLL COMPRESSOR WITH 4:1 MODULATION, INTERNAL OVERLOAD PROTECTION, CRANKCASE HEATER, ACTIVE AND PASSIVE OIL RETURN MANAGEMENT WITH OIL LEVEL SENSOR AND SCHEDULED OIL BOOSTS PLUS MONITORING OF CRITICAL POINTS AND OPERATING CONDITION.
  - THROTTLING LOGIC: ALLOW HIGH HEAD PRESSURE MONITORING THROTTLE MODE FOR HIGH AMBIENT OPERATION, AND LOW SUCTION PRESSURE THROTTLE MODE FOR LOW CAPACITY OPERATION OR ANY CONDITIONS RESULTING IN LOW SUCTION PRESSURE.
  - PUMP-DOWN: ACTIVE PUMP-DOWN MODE WITH DISCHARGE LINE CHECK VALVE TO PROTECT AGAINST LIQUID MIGRATION INTO COMPRESSOR DURING IDLE TIMES.
  - DEFROST MODE IN HEAT PUMP: WHEN OUTDOOR COILS ARE DEEMED AT RISK OF FREEZING, THE UNIT SHALL SIMULTANEOUSLY TURN ON AUXILIARY HEAT WHILE RUNNING THE HEAT PUMP IN "COOLING" MODE TO HELP DEFROST OUTDOOR COILS AS NEEDED WHILE STILL MAINTAINING DESIRED LEAVING AIR TEMPERATURES.
  - REFRIGERANT COILS: ALUMINIUM FINS MECHANICALLY BONDED TO COPPER TUBES, STAGGERED TO INCREASE TURBULANCE AND REDUCE BYPASS FACTOR, INCLUDE TWO PROBE SENSORS TO READ AVERAGE FACE TEMPERATURE.
  - EXPANSION VALVE: PROVIDE ELECTRONIC METERING TYPE FOR EACH CIRCUIT TO ALLOW 0-100% PRECISE SUPERHEAT CONTROL.
  - EVAPORATOR DRAIN PAN: INSULATED 20GA STAINLESS STEEL SLOPED ASHRAE 62 COMPLIANT TYPE FOR FULL COIL AREA AND FLASHED ON ENTERING SIDE.
  - HOT GAS REHEAT: PROVIDE FULLY MODUATING REHEAT VALVE FOR PRECISE DISCHARGE TEMP CONTROL AND INCLUDE EVAPORATOR LEAVING TEMPERATURE SENSOR TO DISABLE REHEAT WHEN LEAVING DEWPOINT MEETS REQUIREMENT WITHOUT DEHUMIDIFICATION.
  - ELECTRIC HEATER.
  - CONDENSER FANS: FULLY MODULATING ELECTRONICALLY COMMUTATED MOTOR (ECM) CONDENSING FANS. THESE FANS SHALL MODULATE TO MAINTAIN A TEMPERATURE DIFFERENTIAL BETWEEN OUTSIDE AIR AND THE OUTDOOR COIL.
  - SAFETIES: 1) SUCTION LINE ACCUMULATOR FOR ADDED PROTECTION AGAINST LIQUID ENTERING SUCTION LINE OF COMPRESSOR; 2) BI-FLOW, LOW PRESSURE DROP, FILTER DRIER; 3) ELECTRONIC EXPANSION VALVE SHALL OPEN PARTIALLY ALLOWING SYSTEM PRESSURE EQUALIZATION PRIOR TO ACTIVATION OF THE COMPRESSOR; 4) ON OPTIONAL HEAT PUMP UNITS, USE OF A SINGLE 3-WAY REHEAT VALVE TO PREVENT OBSTRUCTIONS DUE TO VALVE FAILURE; 5) ON OPTIONAL HEAT PUMP UNITS, USE OF A SINGLE 3-WAY REHEAT VALVE TO PREVENT OBSTRUCTIONS DUE TO VALVE FAILURE; 6) ALL REFRIGERATION PORTS SHALL BE SHORT-STUB ASSEMBLY AND ANY ACCESS PORT WITH A TRANSDUCER OR SWITCH IS MOUNTED VERTICALLY TO MITIGATE RISK OF BENT/CRACKED STUB JOINTS; 7) REFRIGERATION CIRCUIT SHALL BE MECHANICALLY CNC PRE-BENT TUBING WHEREVER POSSIBLE WITH MINIMAL BRAZED JOINTS TO MINIMIZE POINTS FOR POTENTIAL REFRIGERATION LEAKS; 8) FACTORY TESTED FOR LEAKS VIA HIGH PRESSURE NITROGEN DECAY AND HELIUM TRACER GAS TESTING; 9) SUCTION LINE TEMPERATURE SENSOR FAILURE DETECTION.
  - ENERGY RECOVERY: TOTAL ENERGY SEGMENTED POLYMER WITH PERMANENTLY BONDED SILICA GEL DESSICANT ON SLIDE OUT FRAME WITH PRE-TENSIONED URETHANE DRIVE BELT, LISTED PER ANSI/UL 1955, ARI 1060 CERTIFIED ENERGY PERFORMANCE AND AMCA CERTIFIED FAN PERFORMANCE. UNIT SHALL BE CONFIGURED TO ALLOW RECIRCULATION DURING UN-OCCUPIED MODE ONLY.
  - EXHAUST FAN: DIRECT DRIVE CENTRIFUGAL FAN WITH VARIABLE SPEED CONTROL.
  - FILTERS: 2" WASHABLE METAL MESH OUTDOOR AIR FILTER, PLUS 2" MERV 8 MIXED AIR FILTER.
  - CONTROLS: DIGITAL CONTROL FOR ALL COMPONENTS BASED ON SPECIFIED SEQUENCE OF OPERATION USING DISCHARGE TEMP OR SPACE TEMP AS INDICATED AND INTEGRATION TO SPECIFIED BACNET AUTOMATION SYSTEM.

- FANS, VENTILATORS, AND LOUVERS:
- CENTRIFUGAL ROOF: ALUMINIUM BACKWARD INCLINED CENTRIFUGAL WHEEL IN SPUN ALUMINIUM HOUSING WITH INTERNAL VIBRATION ISOLATION, L10 100,000 HOUR PRELUBRICATED BEARINGS, STAINLESS STEEL FASTENERS, BELT OR DIRECT DRIVE MOTOR AS INDICATED ON SCHEDULE. INCLUDE BACKDRAFT DAMPER, BIRD SCREEN, DISCONNECT, AND ROOF CURB.
  - ELECTRIC HEATER
    - WALL HEATER: FAN FORCED WITH CONCEALED CONTROLS, DISCONNECT, AND INTEGRAL TAMPER PROOF THERMOSTAT. SURFACE MOUNTED OR RECESSED, CAPACITY AS INDICATED ON SCHEDULE.

- HORIZONTAL UNIT HEATER: WASH-DOWN STAINLESS STEEL FAN FORCED WITH CONCEALED CONTROLS, DISCONNECT, AND INTEGRAL THERMOSTAT. WALL OR CEILING MOUNTING BRACKET, CAPACITY AS SCHEDULED.

- DUCTWORK, ACCESSORIES AND INSULATION:
- DUCTWORK: GALVANIZED G90 SHEET METAL FABRICATED AND SEALED WITH MASTIC IN ACCORDANCE WITH SMACNA STANDARDS AND FOR THE PRESSURE CLASS OF THE SYSTEM TO EXCEED THE SPECIFIED FAN PRESSURE. PROVIDE LEAKAGE TESTING FOR HIGH PRESSURE SYSTEMS 3"WC AND ABOVE ACCORDING TO ASHRAE AND THE IECC. RETURN AND EXHAUST AIR SYSTEMS SHALL BE CONSTRUCTED AND TESTED TO -2.0" WC PRESSURE CLASS UNLESS OTHERWISE NOTED.
  - BLANKET INSULATION (FIBERGLASS): 3/4 LB/CF GLASS FIBERS BONDED WITH A THERMOSETTING RESIN (UNCOMPRESSED K=0.24, R=4.1 /IN), ASTM C 1290 TYPE III WITH ASTM C 1136 TYPE II FOIL REINFORCED KRAFT (FRK) LOW PERMEANCE VAPOR RETARDER FACING.
  - BOARD INSULATION: 3 LB/CF GLASS FIBERS BONDED WITH A THERMOSETTING RESIN (MIN R-4.1 /IN), ASTM C 612 WITH ASTM C 1136 TYPE II FOIL REINFORCED KRAFT (FRK) LOW PERMEANCE VAPOR RETARDER FACING.
  - DUCT LINER: GLASS FIBER DUCT LINER (K=0.24, R=4.2 /IN) WITH EROSION AND MICROBIAL RESISTANT COATING. THOROUGHLY COAT ALL PENETRATIONS AND EXPOSED EDGES WITH MASTIC. SOUND ABSORPTION COEFFICIENTS (125 HZ) 0.08, (250 HZ) 0.31, (500 HZ) 0.64, (1000 HZ) 0.84, (2000 HZ) 0.97, (4000 HZ) 1.03, NRC=0.70.
  - INSULATION APPLICATION: APPLY INSULATION AS FOLLOWS:
    - INDOOR CONCEALED SUPPLY AND RETURN: 1-1/2" BLANKET WITH VAPOR BARRIER.
    - INDOOR EXPOSED SUPPLY AND RETURN: 1" BOARD WITH VAPOR BARRIER.
    - INDOOR TRANSFER: 1" THICK ACOUSTIC DUCT LINER.
  - BALANCING DAMPERS: PROVIDE GALVANIZED STEEL MANUAL BALANCING DAMPERS WITH GALVANIZED STEEL SHAFTS AND STEEL BEARINGS.
  - TURNING VANES: PROVIDE GALVANIZED STEEL AIRFOIL TYPE TURNING VANES IN DUCT ELBOWS AS INDICATED.
  - CONTROL DAMPERS: PROVIDE ULTRA-LOW LEAK GALVANIZED STEEL DAMPERS GALVANIZED STEEL SHAFTS AND STEEL BEARINGS, NEOPRENE BLADE AND EDGE SEALS.
  - FLEXIBLE DUCTWORK: VINYL LINER, 1-1/2" FIBERGLASS INSULATION (MIN R-5) WITH STEEL WIRE REINFORCEMENT AND VINYL JACKET, MEETING FLAME SPREAD AND SMOKE DEVELOPED REQUIREMENTS OF UL 181.

- AIR DEVICES:
- CONSTRUCTION: PROVIDE REGISTERS, GRILLES, AND DIFFUSERS WITH BAKED WHITE ENAMEL ALUMINIUM CONSTRUCTION, SUITABLE FOR FIELD PAINTING.
  - CEILING DIFFUSERS: ASPIRATING TYPE, SQUARE FACE, WITH ROUND NECK OR SQUARE TO ROUND TRANSITION AND OPPOSED BLADE DAMPER. PRICE MODEL SCD 4-WAY MODEL SMD OR AMD FOR 2-3 WAY OR SIMILAR.
  - GRILLES & REGISTERS: HORIZONTAL FACE BARS WITH 45° DEFLECTION ON ½" CENTERS, OPPOSED BLADE DAMPER FOR REGISTERS. PRICE SERIES 600 OR SIMILAR.

- CONTROLS:
- PROVIDE DIGITAL CONTROLLERS, SENSORS AND CONTROL DEVICES, SWITCHES, RELAYS, ACTUATORS, ENGINEERING AND COMMISSIONING FOR COMPLETE SYSTEM AND SEQUENCES OF OPERATION LISTED BELOW.
  - PROVIDE POWER FOR CONTROLLERS WITH TRANSFORMER AND DISCONNECT FED FROM HVAC UNIT POWER OR UNIT MOUNTED RECEPTACLE AHEAD OF THE MAIN DISCONNECT.
  - PROVIDE 120V POWER FOR CONTROL PANELS, DAMPER ACTUATORS AND VALVE ACTUATORS FROM THE NEAREST 120V OR 120-208V ELECTRICAL DISTRIBUTION PANEL INCLUDING BREAKER, DISCONNECTS, WIRE AND CONDUIT.
  - PROVIDE CONTROL RELAYS FOR INTERLOCKING FANS, AND DAMPERS WITH LOW VOLTAGE SWITCHES AND THERMOSTATS.
  - ATC SYSTEM: PROVIDE INTERFACE TO OWNER'S CAMPUS AUTOMATED LOGIC BUILDING AUTOMATION SYSTEM WITH STANDARD BROWSER WEB ACCESSIBLE GRAPHIC INTERFACE AND FOR CONTROL OF SPECIFIED UNITS, SCHEDULING AND MONITORING OF PACKAGED ROOFTOP EQUIPMENT (WITH MANUFACTURER'S CONTROL S).
  - ROOM TEMPERATURE SENSORS: ANALOG RTD SENSOR WITH SLIDE BAR SETPOINT ADJUSTMENT, AND OCCUPIED OVERRIDE, WITHOUT READOUT.

SEQUENCE OF OPERATION: (ALL SETPOINTS SHALL BE ADJUSTABLE)

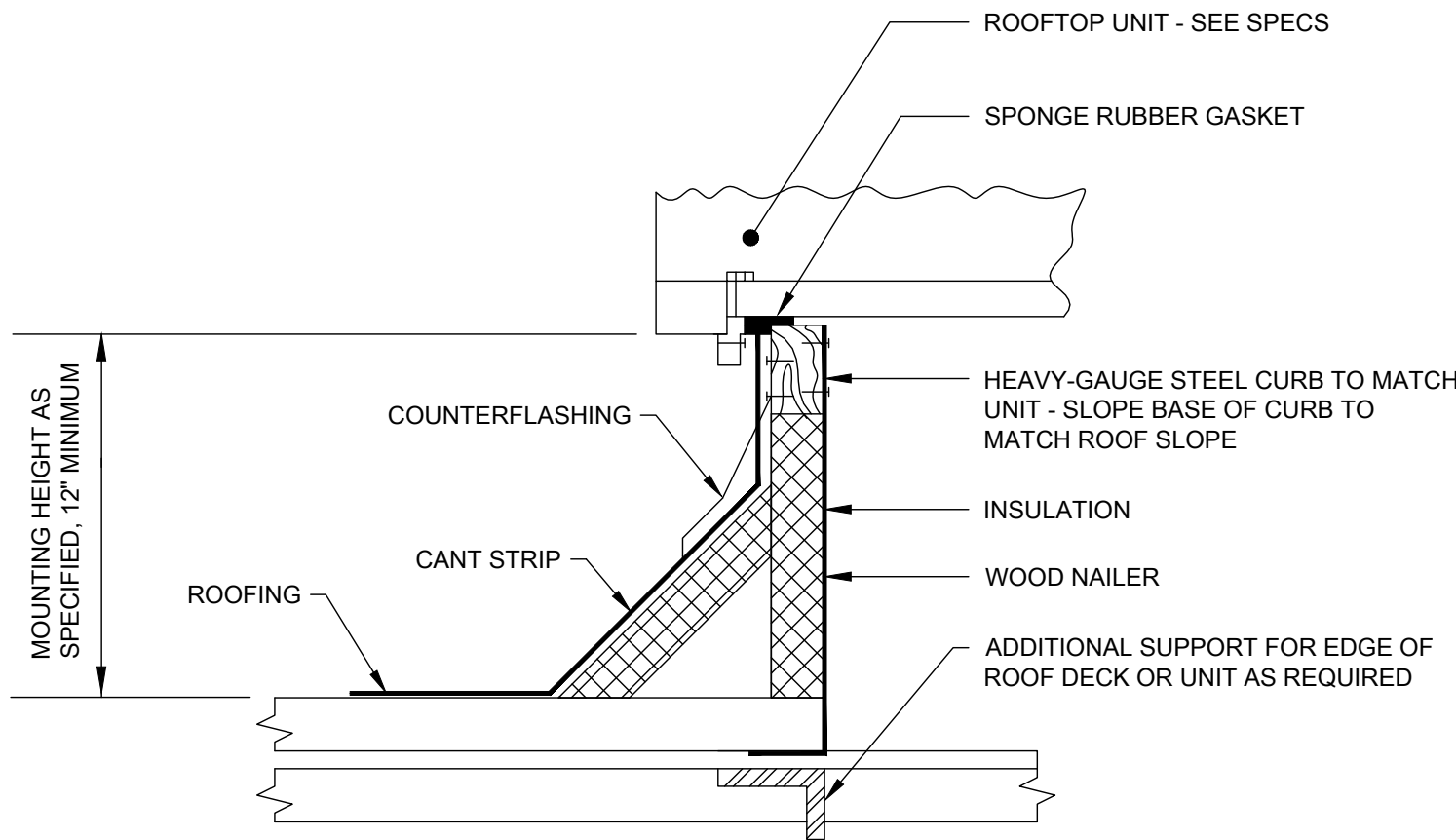
- SPLIT SYSTEM HEAT PUMP:
- CYCLE THE COMPRESSOR IN COOLING MODE OR HEATING MODE TO SATISFY THE SPACE THERMOSTAT. PROVIDE ATC MONITORING FOR SPACE TEMPERATURE.

- CONSTANT VOLUME ROOFTOP UNITS:
- ECONOMIZER (RTU-1 ONLY): ENABLE ECONOMIZER CYCLE WHEN OUTSIDE AIR ENTHALPY IS LESS THAN THE RETURN AIR ENTHALPY AND THE OUTSIDE AIR DRY BULB IS LESS THAN 75°F.
  - OCCUPIED TEMPERATURE CONTROL (BASED ON DDC PROGRAM): OPEN OUTSIDE AIR DAMPER TO MINIMUM POSITION, AND OPERATE SUPPLY FAN CONTINUOUSLY. MODULATE COMPRESSOR(S) IN COOLING OR HEATING TO MAINTAIN SPACE TEMPERATURE SETPOINT 72°F±2°F.
  - HUMIDITY CONTROL: ON A RISE IN SPACE RELATIVE HUMIDITY ABOVE 60% RH, OPERATE COMPRESSOR(S) AT FULL CAPACITY AND MODULATE HOT GAS REHEAT TO MAINTAIN SPACE TEMPERATURE SETPOINT.
  - ENERGY RECOVERY (RTU-2.3.4 ONLY): OPERATE EXHAUST FAN AND WHEEL CONTINUOUSLY. MODULATE WHEEL SPEED TO DEFROST.
  - UNOCCUPIED CYCLE: CLOSE THE OUTSIDE AIR DAMPER, DISABLE WHEEL AND EXHAUST FAN.
  - ATC/ BMS INTEGRATION: PROVIDE SCHEDULING FOR OCCUPIED MODE AND TEMPTURES VIA OWNER'S AUTOMATED LOGIC SYSTEM PLUS MONITORING OF EACH SPACE TEMPERATURE AND HUMIDITY, OPERATION OF UNIT FANS, COMPRESSORS, AND AVAILABLE ALARMS.

- EXHAUST FANS:
- EF-1 - INTERLOCK WITH ATC SYSTEM TO OPERATE CONTINUOUSLY DURING THE OCCUPIED CYCLE. PROVIDE ATC STATUS MONITORING.
  - EF-2 - OPERATE FAN FROM LOCAL THERMOSTAT/HUMIDISTAT AND PROVIDE ATC MONITORING FOR OPERATION.

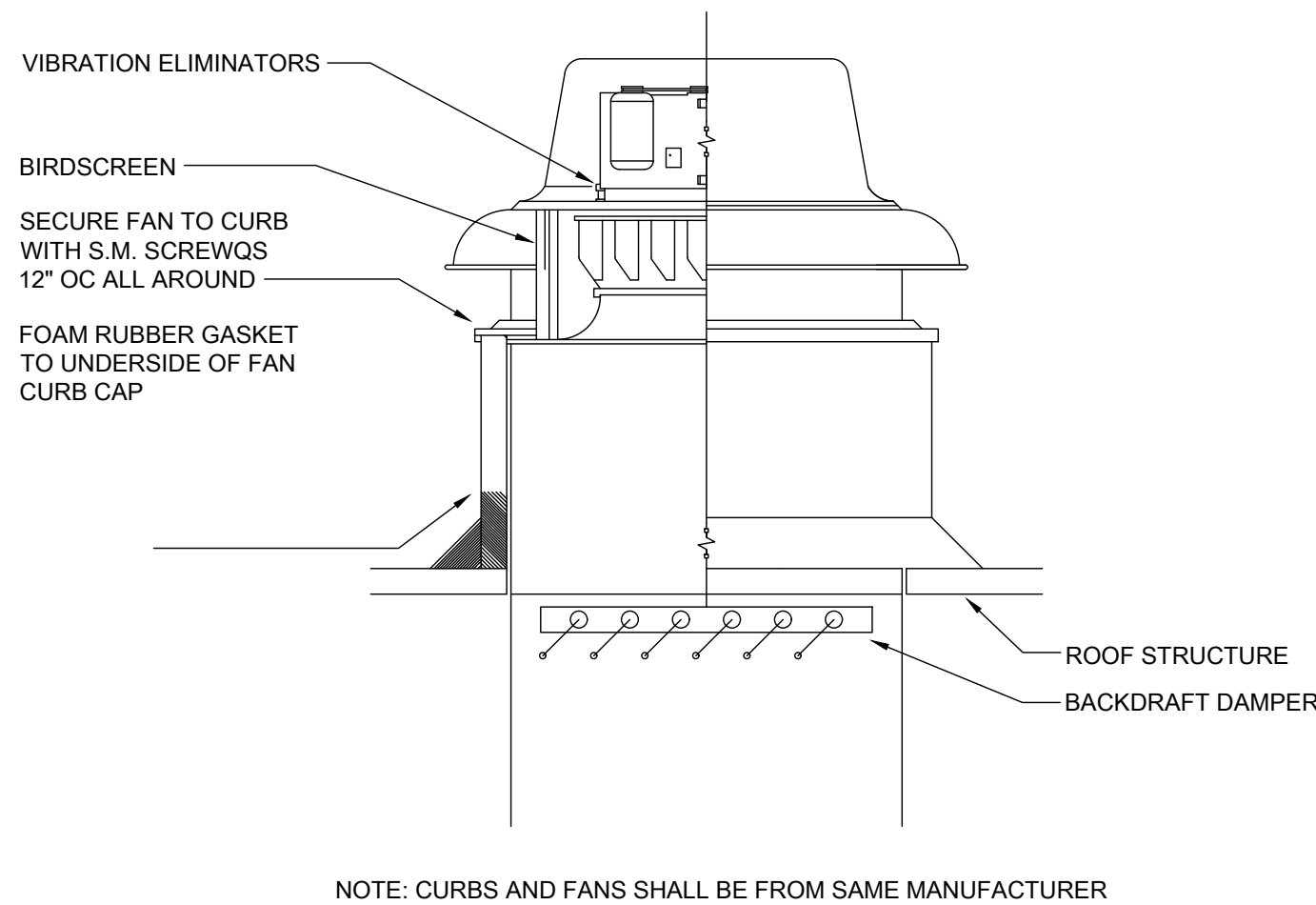
- HVAC AND DOMESTIC HOT WATER SYSTEMS COMMISSIONING:
- APPLICABILITY: PROVIDE HVAC COMMISSIONING TO AFFIRM WINTER AND SUMMER DESIGN CONDITIONS ACCORDING TO THE 2018 IECC, INCLUDING:
- COMMISSIONING PLAN WITH NARRATIVES OF THE SYSTEMS AND EQUIPMENT TO BE TESTED, THE PERSONNEL AND ROLES RESPONSIBLE FOR EACH PHASE, THE STEPS AND SETTINGS USED TO TEST EACH MODE OF OPERATION, REQUIRED MEASUREMENTS AND SETPOINTS USED FOR ALL MODES AND SAFETIES IN THE SPECIFIED CONTROL SEQUENCES.
  - REVIEW DESIGN DOCUMENTS, OWNER'S REQUIREMENTS (IF AVAILABLE) AND FINAL BALANCING REPORT.
  - FIELD VERIFY PROPER INSTALLATION OF MECHANICAL EQUIPMENT PRIOR TO FUNCTIONAL TESTING.
  - PROVIDE A PRELIMINARY COMMISSIONING REPORT AND A FINAL COMMISSIONING REPORT INCLUDING RESULTS OF FUNCTIONAL PERFORMANCE TESTS, DEFICIENCIES, AND CORRECTIVE MEASURES.

- BALANCING:
- VERIFY ALL NECESSARY BALANCING COMPONENTS ARE INSTALLED SUCH AS BALANCING VALVES AND DAMPERS.
  - BALANCE AIR SYSTEMS TO WITHIN 0 TO + 10% OF INDICATED VALUES.
  - SUBMIT REPORTS SPECIFIED UNDER SUBMITTALS



ROOFTOP EQUIPMENT CURB DETAIL

SCALE: NTS



NOTE: CURBS AND FANS SHALL BE FROM SAME MANUFACTURER

ROOF MOUNTED EXHAUST FAN DETAIL

NO SCALE



REVISIONS

NO.	DATE	DESCRIPTION
1	4-9-24	ISSUED FOR BIDDING

HVAC PLANS

H-3

PROJECT NO. 1757-24-001

SCALE: AS NOTED

DATE: 04/09/24

NEW FIELDHOUSE FOR THE MIDD--WEST SCHOOL DISTRICT MIDDLEBURG, PA

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