

SECTION 23 75 00 – SUBSTATION ENCLOSURE HVAC EQUIPMENT

1.01 SUMMARY:

1. Room Type Air Conditioners.
2. Self-Contained Heat Pumps.
3. Electric Unit Heaters.
4. Exhaust Fans.
5. Diffusers and Grills.
6. Backdraft Dampers.
7. Ductwork.
8. Control Building Temperature System.

1.02 RELATED REQUIREMENTS:

- A. Section 13 34 23 23 Fabricated Substation Control Enclosures.
- B. Section 26 24 16 - Panelboards
- C. Section 26 51 23 - Substation Interior Lighting and Receptacles
- D. Section 26 36 00 – Power Switching and Control Devices
- E. Section 33 72 33 33 – Raceway and Boxes for Utility Substations
- F. Section 33 72 33 36 – Cable Tray and Wireway for Utility Substations
- G. Section 33 72 33 33 – Raceway and Boxes for Utility Substations
- H. Section 33 72 33.16 - Relay Switchboards
- I. Section 33 72 43 11 - Substation Wire, Cable and Accessories

1.03 REFERENCE STANDARDS:

- A. General: All equipment and material shall be the latest design, new, undeteriorated, and the first-quality standard product of the manufacturers.
- B. Applicable Standards:
 1. ASTM International (ASTM).
 - a. ASTM B117 Standard Practice for Operating Salt Spray (Fog) Apparatus.
 2. American National Standards Institute (ANSI).
 - a. ANSI/AHRI (Air-Conditioning, Heating, and Refrigeration Institute) Standard 390 Performance Rating of Single Package Vertical Air-Conditioners and Heat Pumps.
 - b. ANSI/ASHRAE Standard 37 - Methods of Testing for Rating Electrically Driven Unitary Air-Conditioning and Heat Pump Equipment.
 - c. ANSI/SMACNA (Sheet Metal and Air Conditioning Contractors National Association) 002 - Rectangular Industrial Duct Construction Standards (Inch-Pound Version).
 - d. ANSI/SMACNA 006 - HVAC Duct Construction Standards - Metal and Flexible
 - e. ANSI/SMACNA - Seismic Restraint Manual: Guidelines for Mechanical Systems.
 - f. ANSI/SMACNA 006 - HVAC Duct Construction Standards Metal and Flexible.
 3. Federal Specifications:
 - a. HH-I-558 Insulation, Blankets, Thermal (Mineral Fiber, Industrial Type)
 4. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):
 - a. ASHRAE Standard 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
 5. American Society of Mechanical Engineers (ASME).
 - a. ASME PTC 4.3 Air Heaters.
 - b. ASME PTC 30 Air Cooled Heat Exchangers.
 - c. ASME Y32.2.4 Graphic Symbols for Heating, Ventilating, and Air Conditioning.
 - d. ASME PTC 11 Fans: Performance Test Codes.
 6. National Fire Protection Association (NFPA):

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- a. 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems
- 7. National Electrical Manufacturers Association (NEMA).
- 8. Federal Occupational Safety and Health Standards (OSHA).
- 9. Underwriters Laboratories (UL)
 - a. UL 1995 Heating and Cooling Equipment.
- 10. State and Local Codes:
 - a. State of Kansas.
 - b. Pertaining local codes.
- C. The Contractor shall provide equipment and material to meet or exceed the performance indicated at Job Site conditions of 2,018 foot altitude.

1.04 COMPLIANCE SUBMITTALS:

- A. Include, but are not limited to, the following:
 - 1. Physical outline drawings for equipment and ductwork.
 - 2. Wiring diagrams.
 - 3. Technical information such as overall dimensions, weight and ratings, etc.
 - 4. Catalog cuts of all equipment furnished.
 - 5. Factory test data if required.
 - 6. Nameplate and cover engravings.
 - 7. Instruction books.
 - 8. Submittals which do not indicate clearly the exact size, model number and optional items to be furnished will be returned to the Contractor for this information before review by the Engineer.

PART 2 - PRODUCTS

2.01 ROOM TYPE AIR CONDITIONERS:

- A. Capacity:
 - 1. Unit shall bear the NEMA certification seal and be rated in accordance with NEMA standards.
 - 2. Cooling and heating capacity in accordance with the results from design calculation.
- B. Casing:
 - 1. Equip with enclosed condenser motors with ball bearings for reliable operation and extended motor life.
 - 2. Equip with control module.
 - 3. Equip with economizer which includes exhaust air damper to operate through room thermostat.
 - 4. Equip with barometric fresh air damper.
 - 5. Furnish adequate supports for the units.
 - 6. Wiring temperature rating 196°F.
 - 7. Furnish throw-away type air filters including 5 spares.
- C. Voltage shall be 120/240 Vac, 1 phase.
- D. Furnish complete with weatherproof covers for each unit.

2.02 SELF-CONTAINED HEAT PUMPS:

- A. Capacity:
 - 1. Unit shall bear the UL certification seal and be rated in accordance with ASHRAE standards for unitary heat pumps.

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2. Cooling and heating capacity in accordance with the results from design calculation.
3. Auto-restart in case of sudden power failure with previous settings.
- B. Casing:
 1. To be constructed of 20-gage steel, cleaned, phosphatized and coated with a baked-on acrylic finish for corrosion resistance.
 2. Casing inside air section to be completely insulated with 1-inch fireproof glass fiber material.
- C. Compressor:
 1. Unit shall contain welded hermetically sealed, high-efficiency reciprocating compressor designed for heat pump duty.
 2. Provide compressor with crankcase heaters, overtemperature, overcurrent, and high-pressure controls.
- D. Refrigerant Circuit: Supply unit complete with a full operating charge of Freon R410A refrigerant, suction accumulator; dual capillary expansion and a high-capacity solenoid-activated reversing valve for automatic mode control.
- E. Defrost Control: Provide defrost logic circuitry to activate defrost cycle on demand and to eliminate nuisance defrost cycling.
- F. Electric Supplemental Heaters:
 1. Provide slide in heater modules in discharge air passage of heat pump.
 2. Multiple staging of supplemental heaters shall be achieved through built in adjustable outdoor thermostats.
 3. Wiring temperature rating 196°F.
- G. Accessories:
 1. Provide unit with economizer package to operate through room thermostat to automatically use outdoor air for cooling when outdoor air temperature and humidity are at acceptable levels.
 2. Provide indoor thermostat with two stage cooling/two-stage heating, fan auto on switch and standby heat normal on switch with indicator light.
 3. Electric supplemental heaters and economizer to be factory-installed and wired.

2.03 HEATERS (HTR):

- A. Radian Electric Unit Heater (Horizontal Discharge):
 1. Quantities, capacities, and ratings in accordance with the results from design calculation.
 2. Low watt density design not more than 200W/f.
 3. Wiring temperature rating 196°F.
 4. Factory standard enamel finish, unless otherwise specified.
 5. Complete controls including:
 - a. Unit-mounted thermostat for automatic temperature control.
 - (1) Factory wired to control heating elements.
 - (2) Range to be approximately 50 to 105°F with an off position.
 6. Unit rated for 120/240 V, 60 hertz, 1 phase.
 - a. Built-in contactor with 115Vac holding coil.
 - b. Built-in thermal cutouts for heater overloads with automatic reset feature.
 7. Individually adjustable louvers for control of discharge air.
 8. Minimum 20-gage steel housing.
 9. Unit mounted disconnect.
- B. Electric Unit Heater (Vertical Discharge):
 1. Same as Horizontal Discharge heater except:
 - a. Provide high-velocity discharge nozzles.

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- b. Provide remote thermostat and control wiring.
- C. Convection Electric Unit Heater:
 - 1. Quantities, capacities, and ratings in accordance with the results from design calculation.
 - 2. Wiring temperature rating 196°F.
 - 3. Factory standard enamel finish, unless otherwise specified.
 - 4. Propeller-type fan with wire fan guard.
 - 5. Complete controls including:
 - a. Unit-mounted thermostat for automatic temperature control.
 - (1) Factory wired to control fan and heating elements simultaneously.
 - (2) Range to be approximately 50 to 105°F with an off position.
 - 6. Unit rated for 120-240 V, 60 hertz, 60 phase.
 - a. Built-in contactor with 115Vac holding coil.
 - b. Built-in thermal cutouts for heater and motor overloads with automatic reset feature.
 - 7. Individually adjustable louvers for control of discharge air minimum 20-gage.
 - 8. Provide hangers and brackets for mounting from walls.
 - 9. Minimum 20-gage steel housing.
 - 10. Unit mounted disconnect.

2.04 EXHAUST FANS:

- A. Furnish and install direct drive heavy duty wall exhauster as indicated.
- B. Housing shall be all heavy-duty aluminum construction.
- C. Fans shall be at least Class I Group C and have a single speed explosion proof motor.
- D. Fan blades shall be fabricated aluminum.
- E. Fans shall be with built in shutters (backdraft damper) that automatically open when the fan starts and gravity closes when the fan stops.
- F. Provide with front and rare fan guard.
- G. Exhaust fan shall be rated 120 V, single phase, 8-inch wheel diameter (minimum), minimum capacity 230 cfm.

2.05 DIFFUSERS AND GRILLES:

- A. Supply Diffuser.
 - 1. Round neck.
 - 2. Mounting frame for ceiling, as indicated on architectural drawings.
 - 3. Volume damper Steel Duct-Mounted Opposed Blade Damper.
 - 4. Equalizing deflector Grid for Round Neck Diffusers.
 - 5. Mount volume damper and equalizing deflector in diffuser neck.
 - 6. Finish: Off-white baked enamel.
- B. Aluminum Return Grille
 - 1. 45 Degree Deflection, Blades Parallel to Long Dimension.
 - 2. One-half-inch spaced louvers.
 - 3. Finish: Off-white baked enamel.

2.06 BACKDRAFT DAMPERS:

- A. Rectangular light-duty pressure-relief type.
- B. Extruded Aluminum 6063T5 frame.
- C. Aluminum blades, 0.025 inch with 1/4-inch steel shafts.
- D. Vinyl gaskets shall be glued and riveted to blade edges.

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2.07 DUCTWORK:

A. Rectangular:

1. All rectangular ductwork shall be constructed of galvanized steel.
2. Minimum gauge, duct construction, joint reinforcing, and fittings shall be in accordance with ASHRAE recommendations and ANSI/SMACNA 006 HVAC Duct Construction Standards metal and flexible.
3. Construct the ductwork in accordance with minimum reinforcement requirements for static pressure class of 1/2-inch W.G., positive or negative.

B. Flexible ducts

1. All flexible ducts shall be constructed of corrugated aluminum; UL listed as Class 1, Standard 181 and comply with latest NFPA 90A Standard.

2.08 CONTROL BUILDING TEMPERATURE SYSTEM:

A. General:

1. Contract Drawings and these Specifications indicate general arrangement of the equipment, controls and devices, types of control schemes, and the extent of remote controls; however, they shall be modified as required to suit the equipment furnished to make the complete systems meet the performance specifications.
2. Furnish all the necessary components so that the system performs as specified and indicated.
3. Completely install, connect, adjust, and test all systems to ensure the entire control system performs satisfactorily as specified.
4. All control components shall be permanently identified by adhesive embossed plastic labels.

PART 3 - EXECUTION

3.01 ROOM TYPE AIR CONDITIONERS:

- A. Install as indicated.
- B. Caulk and seal.
- C. Test and adjust to ensure the equipment performs satisfactorily.

3.02 SELF-CONTAINED HEAT PUMPS:

- A. Install as indicated.
- B. Caulking and sealing.
- C. Test and adjust to ensure the equipment performs satisfactorily.
- D. Install all control circuits necessary so that system performs as indicated.

3.03 ELECTRIC UNIT HEATERS:

- A. Install at locations as indicated.
- B. Install all conduit risers, power and control wiring.

3.04 EXHAUST FAN:

- A. Install as indicated.
- B. Caulking and sealing.
- C. Test to ensure the equipment performs satisfactorily.

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- 3.05 DIFFUSERS AND GRILLES: Install diffusers and grilles so gaskets seal airtight against ducts or finished surfaces.
- 3.06 BACKDRAFT DAMPERS: Install dampers to ensure free operation from full-open to full-close position without binding.
- 3.07 DUCTWORK INSULATION:
- A. All rectangular ductwork shall be insulated with 1-inch thick, 1-1/2-pound density, permacoat acoustical liner that meets or exceeds all ASTM C1071 Type II duct liner requirements.
 - B. All flexible ducts shall be insulated with 1-inch, 3/4-pound density glass fiber blanket and an exterior covering and vapor barrier of flame resistant vinyl film.
 - C. Ductwork exposed to the environment shall be wrapped with 1-inch thick flexible blanket type thermal insulation.
 - 1. The insulation shall be completely weatherproof by applying two coats vapor barrier mastic spray with a fiberglass cloth membrane.

END OF SECTION 23 75 00