SECTION 237433 - DEDICATED OUTDOOR-AIR UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes factory-split system unit capable of supplying up to 100 percent outdoor air and providing cooling, heating and dehumidification.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Include dimensional drawings, weights and clearances.

1.3 INFORMATIONAL SUBMITTALS

A. Startup service reports.

B. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to replace components of units that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Compressors: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE

A. Refer to Drawing Schedules for required configuration, performance and accessories.

2.2 UNIT CONSTRUCTION

A. Cabinet panels: 2” double-wall foamed panel construction throughout the indoor section of unit to provide nonporous, cleanable interior surfaces. All interior seams exposed to airflow shall be sealed.

B. Insulation: 2” polyisocyanurate foam metal encapsulated with no exposed edges. Initial R value of 6.5 per inch of thickness.

C. Cabinet base shall be double wall construction designed to prevent trapping or ponding of water within the unit base. Cabinet base pan shall be insulated with 2” thick polyisocyanurate foam. Foam insulation shall be fully enclosed with galvanized steel insulation cover. Insulation shall not be applied to underside of unit base.

D. Cabinet Base Rails: Side and end base rails shall include openings for forklift and tie-down access. To protect unit base from fork damage side rails shall include removable heavy gauge fork pockets.

E. Shipping anchors attach to and/or through unit base rails. Straps over unit shall not be used to secure unit for shipping.

F. Cabinet material interior and base rails: shall be G-90 zinc-coated galvanized steel. Material gauge shall be a minimum of 14-gauge for base rails, 16-gauge for structural members and 22-gauge for access doors and cabinet panels.

G. Exterior Corrosion Protection: Exterior cabinet panels shall be 22-gauge steel with both exterior and interior surfaces cleaned, phosphatized and finished with a weather-resistant baked enamel finish. Unit’s surface shall be in compliance with ASTM B45 salt spray testing at a minimum of 672-hour duration.

H. Cabinet construction shall provide hinged panels providing easy access for all parts requiring routine service.

I. Cabinet top cover shall be one-piece construction or where seams exist, it shall be double-hemmed and gasket-sealed.

J. Hinged Access Panels: Water- and air-tight hinged access panels shall provide access to all areas requiring routine service including air filters, heating section, electrical and control cabinet sections, supply air fan section, evaporator and reheat coil sections. Insulated doors shall be constructed to allow the hinges to be reversed in the field.

K. Hold-open devices shall be factory installed on all hinged access doors. Chains shall not be used as hold-open devices.

L. Latches with locking hasp or tool operated closure devices shall be factory installed on all hinged access panels.

M. Drain Pan material shall be Type 430 Stainless steel drain and constructed to sloped in two directions to ensure positive drainage with corners exposed to standing water and drain fittings welded liquid tight to prevent leaks. Pan shall have a minimum depth of 2”. Base of drain pan shall be insulated with 1” thick foam insulation.

N. Provide openings either on side of unit or thru the base for power and control connections.

O. Unit shall be equipped with a 6” filter rack upstream of the evaporator. Frame shall be field-adjustable to match any filter combination specified in the following section.

P. Motorized dampers
1. Frame shall be constructed of a 16 gage galvanized steel hat-channel.
2. Blades shall be constructed of 16 gage galvanized steel strengthened by three longitudinal 1 inch deep “vee” grooves.
3. Blades shall be symmetrical relative to its axle pivot point.
4. Axle bearings shall be synthetic sleeve-type and rotate inside extruded holes in the damper frame.
5. Blade seals shall be extruded vinyl permanently bonded to the appropriate blade edges.
6. Frame shall include flexible stainless steel compression-type jamb seals.
7. Modulating spring-return actuators shall be provided by the factory, installed on the damper, and wired to the control center. Each damper shall have a dedicated actuator. Single actuators with gear trains are not acceptable.
8. Damper leakage shall be no more than 3 cfm/sq.ft. at 1 in.wg static pressure.

2.3 REFRIGERATION SYSTEM

A. Air Cooled DX: Unit shall be provided with factory piped, charged, and tested packaged air-cooled direct expansion refrigeration system.

B. Compressors:
1. Compressors shall include the following items:
   a. Suction and discharge service valves.
   b. Suction and discharge isolation valves.
   c. Reverse rotation protection.
   d. Oil level adjustment.
   e. Oil filter.
   f. Filter drier
   g. Short cycling control.
   h. High and low pressure limits.
   i. Crankcase heaters.
2. Compressors shall be installed in a separate compartment, above the unit floor, and isolated from the surrounding environment by double wall foam injected panels and access doors.
3. Compressors shall be installed using manufacturer's recommended rubber vibration isolators.
4. Capacity control shall be provided through the use of a variable capacity compressor. Additional compressors, if required, shall be fixed or variable capacity compressors.

C. DX Cooling Coil:
1. Coil shall be rated in accordance to AHRI standards, designed to withstand 250 psig working pressure at 300 degrees F, and pressure tested to 600 psig.
2. Coil shall be a minimum of 4 rows deep with maximum fin density of 12 fins per inch.
3. Refrigeration systems with more than one circuit shall have interlaced evaporator coils.
4. Coil casing shall be constructed of 304 stainless steel.
5. Coil tubes shall be constructed of 1/2" diameter, 0.016" thick seamless copper tubing.
6. Coil fins shall be constructed of 0.0060" thick aluminum.
7. Cooling coils shall include corrosion-resistant, electrostatically-applied coating rated for 5,000 hours in accordance with ASTM B117.
8. Drain pan:
   a. Drain pan shall be constructed of a minimum of 18 gage 430 stainless steel.

b. Drain pan shall be double-sloped to ensure condensate removal from unit.
c. Drain pan shall extend a minimum of 8” past the evaporator coil to ensure condensate retention.

D. Hot Gas Reheat:
1. Hot-gas reheat coil shall be separated from the evaporator coil by a minimum of 6” in the direction of airflow to prevent the re-evaporation of condensate, provide room for coil cleaning, and allow control system to monitor evaporator coil leaving dew point temperature.
2. Coil shall be rated in accordance to AHRI standards, designed to withstand 250 psig working pressure at 300 degrees F, and pressure tested to 600 psig.
3. Coil casing shall be constructed of 304 stainless steel.
4. Coil tubes shall be constructed of 5/16" diameter, 0.012" thick seamless copper tubing.
5. Coil fins shall be constructed of 0.0060" thick aluminum fins.
6. Hot-gas reheat shall be controlled through a factory-supplied and controlled modulating 3-way valve.

E. Air-Cooled Condenser:
1. Air cooled condenser coil shall be unit mounted.
2. Provide condenser coils with galvanized casing, seamless copper tubes, and aluminum fins.
3. Coil shall be rated in accordance to AHRI standards, designed to withstand 250 psig working pressure at 300 degrees F, and pressure tested to 600 psig.
4. Coil casing shall be constructed of 304 stainless steel.
5. Coil tubes shall be constructed of 5/16" diameter, 0.012" thick seamless copper tubing.
6. Coil fins shall be constructed of 0.0060" thick aluminum fins.
7. Condenser coils shall include corrosion-resistant, electrostatically-applied coating rated for 3,000 hours in accordance with ASTM B117.
8. Condenser coils shall include factory provided and installed condenser coil guards.
9. Condensing section shall be equipped with direct-drive condensing fans.
10. Condensing fan assembly shall be statically and dynamically balanced in accordance with AMCA Standard 204-05.
11. Condensing fan assembly shall consist of aluminum-bladed propeller fan wheel, formed-channel base, formed inlet venturi, and coated steel basket guard on the discharge.
12. A factory-supplied variable frequency drive shall be provided to modulate a single condensing fan to maintain refrigerant pressure in the condensing section.
13. All additional condensing fans shall enable/disable to maintain refrigerant pressure in the condensing section.

2.4 BLOWERS

A. Fan assemblies shall be direct-drive without the use of belts or adjustable sheaves.

B. The indoor fan motor shall be available speed motor with integrated power.

C. Fan wheels shall be constructed of corrosion-resistant, fiber-reinforced polyamide with backward curved blades. or Fan wheels shall be constructed of welded aluminum with airfoil blades.

D. Fan wheel shall be tested in accordance to AMCA 210.

E. Fans may be full width or partial width. Fans modified to partial width through the use of banding or other blade reduction method are not acceptable.

F. Fans shall be rigidly mounted to structural base or Fans shall be mounted on minimum 1” tall neoprene isolators.

2.5 ELECTRIC-RESISTANCE HEATING COIL

A. UL Compliance: Comply with requirements in UL 1995, "Heating and Cooling Equipment."

B. Electric-Resistance Heating Elements:

1. Coiled Resistance Wire: 80 percent nickel and 20 percent chromium.
2. Tubular-Steel Sheath: Compacted magnesium oxide powder.
3. Fins: Spiral-wound, copper-plated, steel fins continuously brazed to sheath.
4. Heating Capacity: Low density 35 W per sq. in, factory; with time delay for element staging and overcurrent- and overheat-protection devices.
5. Safety Controls:

   a. Blower-motor interlock, air-pressure switch.
   b. Quiet mercury contactors.
   c. Time delay between steps.
   d. Integral, nonfused power disconnect switch.

2.6 FILTERS

A. Outdoor air filter rack shall accommodate factory-provided 2" MERV8 filters.

B. Filter sections shall be accessible through a 2" foam-injected, double-wall, hinged access door with quarter-turn latches.

2.7 ELECTRICAL

A. Unit shall be constructed with an integral electrical and control center isolated from supply airflow, exhaust airflow, compressors, and heating elements. The control center shall control all aspects of the unit operation.

B. Units shall be wired according to NEC and listed per ETL. ETL listing shall cover all components of the ventilator and not be limited to the control panel. All major electrical components shall be UL or ETL listed.

C. Unit shall be provided with phase and brown out protection which shuts down all motors in the unit if the electrical phases are more than 10% out of balance on voltage, the voltage is more than 10% under design voltage, or on phase reversal.

D. The following items shall be provided and wired within the control center by the factory:
1. Non-fused disconnect.
2. Sub-circuit fusing.
3. Low voltage transformers.

4. Controls as specified in this section.
5. Control circuit fusing.
6. Terminal block.

E. Electrical panel must house all high voltage components such as terminal blocks and fuse blocks.

2.8 CONTROLS

A. Units shall include factory supplied, mounted, wired, and tested stand-alone microprocessor controls.

B. Microprocessor controller shall be factory-programmed for discharge air control and use an internal 7-day time clock.

C. Microprocessor controller shall include local liquid crystal display (LCD) for user interface. Microprocessor controller remote LCD shall be mounted in a weather-proof enclosure and accessible without exposing the operator to high voltage wiring or having to turn off or circumvent the main disconnect.

D. Include control capability to sequence components so as to deliver room neutral supply air (adjustable).

E. The following sensors shall be factory supplied, mounted, and wired inside the unit:
1. Outdoor air humidity sensor.
2. Outdoor air temperature sensor.
3. Evaporator coil leaving air temperature sensor.
4. Supply air filter pressure monitoring switch and/or magnehelic gauge.

F. The following devices shall be factory-supplied for field installation and wiring:
1. Supply air temp temperature sensor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's rigging and installation instructions for unloading units and moving to final locations.

B. Install separate devices furnished by manufacturer and not factory installed.

C. Install new filters at completion of equipment installation and before testing, adjusting, and balancing.

D. Install drain pipes from unit drain pans to approved discharge locations:
1. Drain Piping: Schedule 40 PVC pipe complying with ASTM D 1785, with solvent-welded fittings.
2. Pipe Size: Same size as condensate drain pan connection.

3.2 CONNECTIONS

A. Where installing piping adjacent to units, allow space for service and maintenance.

B. Duct Connections:

1. Comply with requirements in Section 233113 "Metal Ducts."
2. Drawings indicate the general arrangement of ducts.
3. Connect ducts to units with flexible duct connectors. Comply with requirements for flexible duct connectors in Section 233300 "Air Duct Accessories."

C. Electrical Connections: Comply with requirements for power wiring, switches, and motor controls in electrical Sections.

1. Install electrical devices furnished by unit manufacturer but not factory mounted.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

C. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including all connections.

D. Tests and Inspections:
1. Operational Test: After electrical circuitry has been energized and crankcase heaters have had sufficient on-time, start units to confirm proper motor rotation and unit operation.
2. Enter or adjust all controller set-points as required to meet specific project requirements.
3. Set initial temperature and humidity set points.
4. Set field-adjustable switches as indicated.
5. Air-to-air energy recovery equipment will be considered defective if it does not pass tests and inspections.
6. Prepare test and inspection reports.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to demonstrate and document proper operation in presence of Architect/Engineers.

3.5 OWNER TRAINING

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain dedicated outdoor air units. Submit documentation of Owner personnel receiving training.

END OF SECTION 237433