

SECTION 236500 – SPECIAL EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. General provisions and other HVAC systems are specified in other Sections of Division 23.
- B. This Section covers special HVAC equipment.
- C. Automatic temperature controls are specified in Section 238000, Automatic Temperature Controls.
- D. Testing, adjusting and balancing is specified in Section 230095, Testing, Adjusting and Balancing.
- E. This Section includes responsibilities and obligations in support of the performance verification specified in Section 230090, HVAC Performance Verification.

1.2 QUALITY ASSURANCE

- A. Conform to the following:
 - 1. North Carolina State Electrical Code-2017.
 - 2. North Carolina State Energy Conservation Code-2018.
 - 3. North Carolina State Mechanical Code-2018.
- B. Pressure/temperature ratings of components and accessories shall meet or exceed design conditions for the system in which they are installed. Refer to Section 231000, Piping, Valves and Accessories, and requirements specified herein.

PART 2 - PRODUCTS

2.1 ENERGY RECOVERY UNITS

- A. Complete factory fabricated, custom-built, weatherproof, total air handling/energy recovery system with supply fans, exhaust fans, bearings, motors, drives, drive guards, variable frequency drives, cooling coils, heating coils, dampers, energy recovery wheels, filters, filter pressure gauges, and vibration isolation housed in a finished solid double-wall casing with thermal insulation and drain pan. Functional components shall be accessible for inspection and maintenance through hinged, solid double-wall access doors in each section.
- B. Units shall be run tested after assembly to ensure proper operation and a certified run test report shall be furnished. Units shall be factory leak tested by raising the static pressure to the operating static pressure and measuring the air leakage through a calibrated orifice plate. Maximum allowable leakage shall be no more than 1% of the supply fan cfm for the unit. Units shall be delivered to suit construction and handling requirements.
- C. Casings: panels shall be 2" thick with 20 gauge galvanized exterior sheeting and 22 gauge solid inner liner designed for positive 8" wg operating pressure. Fill material shall be 2" thick, 3 pcf mineral wool or foamed injected insulation with no uninsulated voids. Inner surfaces shall be smooth and accessible for cleaning. Provide hinged, double-wall access doors in service plenums and at locations indicated on the Drawings with minimum 60" height. Vaporproof service lights shall be provided in each casing section and wired to a switch outside the casing along with a 120 V AC convenience outlet. Provide sleeves through casing floor for piping, wiring and controls. Floor construction shall include structural reinforcement to support

internal equipment plus two 250 lb maintenance workers in each plenum. Provide weatherproof intake and exhaust sections including hoods or louvers. Hardware, fasteners and miscellaneous materials shall be corrosion-resistant. Assembled unit or each section of sectional units shall be provided with lifting lugs.

- D. Drain pans: constructed of type 304 stainless steel, sloped to provide positive self-drainage, with drain opening easily accessible for cleaning. Units with stacked cooling coils shall include a secondary drain pan under each coil with drain piping to main pan. Drain pans shall extend upstream and downstream as necessary to prevent wetting of service plenums or carryover of moisture droplets at 450 fpm cooling coil face velocity. Provide auxiliary drain pans or flashing to prevent wetting of unit floor from condensation on cooling coil return bends, piping or other cold surfaces within the unit.
- E. Supply and exhaust fans: centrifugal, plug type, designed without a scroll type housing, tested in accordance with ASHRAE 51/AMCA 210-2016. Fan wheels shall have continuously welded, die-formed airfoil blades with nonoverloading characteristics. Complete fan assemblies shall be statically and dynamically balanced.
- F. Bearings: pillow block or flange type with L_{10} life of 200000 hours at the peak operating condition.
- G. Motors and motor starters: as specified in Section 230010, HVAC General.
- H. Drives: V-belt type, as specified in Section 237000, Air Distribution.
- I. Variable frequency drives: as specified in Section 230010, HVAC General.
- J. Control dampers: provide dampers, as specified in Section 237000, Air Distribution, at intake and exhaust to control airflow.
 - 1. Control damper actuators: as specified in Section 238000, Automatic Temperature Controls.
 - 2. Other control system components: provide and install control devices located within the casings, as described in Section 238000, Automatic Temperature Controls. Coordinate type and characteristics of devices with the controls subcontractor.
- K. Energy recovery wheels: as specified in Paragraph 2.05, Energy Recovery Wheels.
- L. Filters: pleated type, as specified in Section 237000, Air Distribution.
- M. Filter pressure gauges: provide filter pressure gauges, as specified in Section 237000, Air Distribution. Gauges shall be surface-mounted on unit with high and low pressure connection, according to manufacturer's recommendations. Provide hood for gauges exposed to weather.
- N. Internal vibration isolation: internal vibration isolators shall be provided for supply and exhaust fan assemblies mounted on a common steel vibration base. Fans shall have a flexible connection to the casing. Internal vibration isolators shall be as specified in Section 230010, HVAC General, with minimum static deflection of 1.5".
- O. Electric control wiring: termination panels with terminal strips on exterior of casing, with wiring to each sensor and control component located within the unit. Wiring shall be in accordance with Section 238000, Automatic Temperature Controls.
- P. Main electric power wiring (fan motors): 480 V, 3-phase, 60 Hz wiring for main unit power serving fan motors shall be factory wired to a single connection point at a disconnect switch mounted on the unit exterior, for incoming 480 V, 3-phase, 60 Hz power source. Wiring shall be in accordance with Division 26.
- Q. Auxiliary electric power wiring: 120 V, 1-phase, 60 Hz wiring for auxiliary unit power serving lights and convenience outlets shall be factory wired to a single connection point at a disconnect switch mounted on

the unit exterior, for incoming 120 V, 1-phase, 60 Hz power source. Wiring shall be in accordance with Division 26.

- R. Manufacturer: Annexair, Daikin, Johnson Controls/York Solution, or Trane, Buffalo, Environmental Air Systems, Semco, or Greenheck

2.2 ENERGY RECOVERY WHEELS

- A. Energy recovery wheels: rotor media shall be made of coated, corrosion resistant aluminum. Surfaces shall be coated with a nonmigrating absorbent specifically designed for the selective transfer of water vapor. Provide an independent cross contamination test per ASHRAE 84-2013, proving the internal pore diameter of the desiccant does not exceed 4.0 angstroms or other means to limit carryover ratio to a maximum of 0.2%. The rotor media shall recover both sensible and latent energy with the same level of efficiency. Performance shall be clearly documented through a certification program conducted in accordance with AHRI 1060-2018 and ASHRAE 84-2013. The certification shall be conducted by a qualified independent organization. The media shall be cleanable with low temperature steam, hot water or light detergent, without degrading the latent recovery. Dry particles up to 800 microns shall freely pass through the media.
1. Purge sectors: the unit shall be provided with a factory set, field-adjustable purge sector (for non-contact seals) designed to limit cross contamination to less than 0.2% of that of the exhaust airstream concentration for wheels in outside air/exhaust air applications.
 2. Rotor seals: the rotor shall be supplied with labyrinth seals for nonpolished wheel surfaces rotating at higher than 20 rpm, which are at no time to make contact with any rotating surface of the exchanger rotor. Multipass seals shall utilize four labyrinth stages. For rotors with machine polished surfaces with a rotation of 20 rpm or less, provide a full contact seal. Contact seals shall be fabricated of abrasion resistant heavy weight polyethylene designed for the life of the wheel.
 3. Rotor support systems: the rotor media shall be provided in a segmented fashion to allow for field erection or replacement of one section at a time without requiring side access for wheel sizes larger than 96". The media shall be held by a structural spoke system made of extruded aluminum.
 4. Rotor housings: the rotor housing shall be a structural frame which limits the deflection of the rotor due to air pressure differential to less than 0.03125". The housing shall be made of galvanized steel. Rotors shall be supported by 2 rolling element bearings either permanently lubricated or, if regreaseable, designed to be maintained or replaced without the removal of the rotor from its casing or the media from its spoke system.
 5. Drive systems: the rotor shall be driven by a self-adjusting belt system. Motors shall be utilized for both constant and variable speed applications.
- B. Manufacturer: AnnexairDaikin, Johnson Controls/York Solution, or Trane, Buffalo, Environmental Air Systems, Greenheck.

PART 3 - EXECUTION

END OF SECTION 236500