SECTION 237223 - PACKAGED AIR-TO-AIR ENERGY RECOVERY UNITS

PART 1 GENERAL

2.1 SECTION INCLUDES

A. Packaged dessicant air-to-air energy recovery units.

2.2 RELATED SECTIONS

A. Section 099123 - Interior Painting.

2.3 REFERENCE STANDARDS

A. ARI 1060 - Performance Rating of Air-to-Air Heat Exchangers for Energy Recovery Ventilation Equipment; 2009.

B. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2007.

C. ASHRAE Std 84 - Method of Testing Air to Air Heat Exchangers; 1991.

D. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2009a.

E. ASTM C1338 - Standard Test Method for Determining Fungi resistance of Insulation Materials and Facings; 2008.

F. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2010.

G. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 1996 (Reapproved 2002).

H. NFPA 70 - National Electrical Code; 2008.

I. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2009.

J. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; 2006

K. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Current Edition, Including All Revisions.

L. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials;

Current Edition, Including All Revisions.

2.4 SUBMITTALS

A. See Section 013300 - Submittal Procedures for submittal procedures.

B. Product Data: Manufacturer's installation instruction, product data, and engineering calculations.

C. Shop Drawings: Show design and assembly of energy recovery unit and installation and connection details.

D. Manufacturer's qualification statement.

E. Closeout Submittals: Submit manufacturer's operation and maintenance instructions.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 016000 - Product Requirements, for additional provisions.
2. Spare Parts: One of each kind of filter.

2.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Firm regularly engaged in manufacturing energy recovery units..
2. Products in satisfactory use in similar service for not less than five years.

2.6 DELIVERY, STORAGE, AND HANDLING

A. Store in manufacturer's unopened packaging.

B. Store products to be installed indoors in dry, heated area.

2.7 WARRANTY

A. See Section 017700 - Closeout Procedures, for additional warranty requirements.

B. Warranty ventilator to be free from defects in material and workmanship and of all parts for period of 1-1/2 years from date of Substantial Completion.

C. Warranty energy recovery wheel to be free from defects in material and workmanship for 3 years under circumstances of normal use.

D. Warranty motor to be free from defects in material and workmanship for 7 years under circumstances of normal use.

E. Warranty dessicant core to be free from defects in material and workmanship for 5 years

under circumstances of normal use.

PART 2 PRODUCTS

3.1 MANUFACTURERS

A. Energy Recovery Ventilators:

1. Semco Inc.; Model ____:www.semcoinc.com.
2. Greenheck.
3. Substitutions: See Section 016000 - Product Requirements.

3.2 ENERGY RECOVERY UNITS

A. Energy Recovery Units: Dessicant wheel type; prefabricated packaged system designed by manufacturer.

1. Access: Hinged and/or screwed access panels on front.
2. Framing: Welded extruded aluminum tubular frame capable of supporting components and casings.
3. Permanent name plate listing manufacturer mounted inside door near electrical panel.

3.3 CASING

A. Wall, Floor, and Roof Panels:

1. Panels: Removable.
2. Construction: 1 inch (25 mm) thick, double wall box construction, with formed edges of exterior wall overlapping formed edges of interior wall.
3. Exterior Wall: galvanized steel sheet.
   a. 20 gage (1 mm) galvanized steel.
   b. Color: Gray.
4. Interior Wall: Galvanized sheet metal.
   a. 22 gage (0.7 mm) galvanized sheet metal.
5. Insulation:
   a. 1/2 inch (13 mm) insulated fiberglass.
   b. Panel Cores: Mineral wool board.
   c. Include antimicrobial protection.
   d. Mold, Fungi, and Bacteria Resistance: ASTM C 1338, ASTM G 21, and UL 181.
   e. Flame Spread Index: 25, maximum, when tested in accordance with ASTM E84, NFPA 255, and UL 723.

f. Smoke Developed Index: 50, maximum, when tested in accordance with ASTM E84, NFPA 255, and UL 723.

B. Access Panels: Provide access to components through a large, tightly sealed and easily removable panel.

C. Duct Connection Collars: 0.08 inches (2 mm) aluminum, continuously welded.

3.4 FANS

A. Provide separate fans for exhaust and supply blowers.

B. Fans:

1. Individually driven with a dedicated motor.
2. Backward inclined.
3. Single width, single inlet.
4. Class 1 aluminum wheels.
5. AMCA-rated.
6. Provide with non-overloading characteristics.
7. Provide non-sparking integral spun steel venturie inlet cones.

C. Bearings:

1. Pillow block.
2. Bearings: Permanently lubricated sealed ball bearings.
3. Rated for not less than 200,000 hours of operation with accessible greased fittings.

D. Housings: 12 gage (2.6 mm) aluminized steel with plenums integral to general housing and constructed to Class 1 fan standards.

E. Motors:

1. Motors: Open drip proof.
2. Efficiency: High.
3. Speed: Single.
4. Control: Constant Speed.
5. Motor Slide Bases: Removable and adjustable.
6. Fan Motor: Thermal overload protected.
7. Fan Motor: UL listed and labeled.

3.5 TOTAL ENERGY WHEEL

A. Wheel: Transfer heat and humidity from one air stream to the other with minimum carryover of the exhaust air into the supply air stream.

B. Energy Wheel Media: Cleanable with low temperature steam, hot water or light detergent, without degrading the latent recovery.

C. Wheel Effectiveness: Rated in accordance with ASHRAE Std 84 and ARI 1060.

D. Flame Spread Index: 25, maximum, when tested in accordance with ASTM E84, NFPA 255, and UL 723.

E. Smoke Developed Index: 50, maximum, when tested in accordance with ASTM E84, NFPA 255, and UL 723.

F. Energy Recovery Wheel Media Face:

1. Conform to NFPA 90A.
2. Coating: Acid resistant coating.

G. Coat all corrugated surfaces with a thin non-migrating absorbent layer.

H. Wheel Cassette: Easily removable from the unit.

I. Rotor:

1. Type: Non-segmented hygroscopic aluminum wheel.
2. Mounted on permanently lubricated bearings.
3. Rotor Matrix: Corrosion resistant aluminum alloy composed of alternating corrugated and flat, continuously wound layers of uniform widths.
4. Depth: 8 inches (203 mm).
5. Rotor wheel: Reinforce with spokes, welded at the hub and perimeter to prevent any uneven run out during normal operations.

J. Desiccant:

1. Type: 3A.
2. Performance:
   a. Desiccant: Non-dissolving, permanent, and resistant to damage from compressed air, low temperature steam, hot water or by vacuum cleaning.
3. Ventilation Factor: 1.00.

K. Pneumatic Seals: Extruded adjustable brush seals.

1. Locations:
   a. Around perimeter of wheel, and mounted perpendicular to face of wheel.
   b. Separation between exhaust and supply air streams on both sides of wheel.

2. Pressure Differential: Adjustable by means of a lockable quadrant operator.

L. Drive:

1. Drive: Tensioned drive with full perimeter link style belt.
2. Inertial Shock Absorber: Absorb start and stop inertial shock to gear reducer.
3. Select above or below depending on type of motor required.

M. Purge Angle:

1. Purge Angle: Field adjustable from zero to six degrees of rotor circumference arc to suit the prevailing pressure conditions.
2. Divert sufficient supply air to accomplish full purging of exhaust-air from energy wheel to achieve no cross contamination.

3.6 FILTERS

A. Thickness: 1 inch (___ mm).

B. Exhaust and Fresh Air Streams: MERV7 filters constructed to meet ASHRAE Std 52.2.

C. Filter Racks: Bolt-on rack constructed of 0.08 inch (2 mm), minimum, thick aluminum with hinged side access door and snap fasteners.

D. Provide spare set of filters.

3.7 DAMPERS

A. Exhaust Back-Draft Damper: Factory installed, galvanized steel.

1. High performance, backdraft dampers suitable for application in HVAC systems with velocities to 3000 feet per minute (914 m/min).
2. Damper Capacity: Demonstrate damper capacity to withstand HVAC system operating conditions.
   a. Closed position: 6 inches w.g. (1.5 kPa).
   b. Open position: 3000 feet per minute (914 m/min).
3. Fabrication:
   a. Frame: 20 gage (1.0 mm), 3 inch (76 mm) roll formed galvanized steel channel with rear flange, prepunched mounting holes, and welded corner clips for maximum rigidity.
   b. Blades:
      1) Style: Single-piece, overlap frame.
      2) Material: Roll formed 28 gage (0.5 mm) galvanized steel.
      3) Width: Maximum 6 inches (152 mm).
   c. Blade Seals: Extruded vinyl, mechanically attached to the blades edge.
   d. Linkage: Galvanized steel tie bar with stainless steel pivot pins mounted on blades.
   e. Axles: Stainless steel.

f. Mounting: Vertical.
g. Finish: Mill galvanized.

3.8 VIBRATION ISOLATION

A. Vibration Isolation: Provide whole unit vibration isolation with the energy recovery unit assembly.

B. Construct with appropriately-sized, seismic-rated, corrosion-resistant captive-spring isolators.

3.9 POWER AND CONTROLS

A. Motor Control Panels: UL listed.

B. Include necessary motor starters, fuses, transformers and overload protection according to NFPA 70.

C. Provide single-point field connection to power supply.

D. Provide non fused main disconnect integral to control panel.

E. Install wiring in accordance with NFPA 70.

F. Wiring: Enclosed in flexible, liquid tight steel conduit.

3.10 ACCESSORIES

A. Freeze Protection Thermostat:

1. Equip unit with thermostat such that unit can be stopped when temperature drops to 23 degrees F (minus 5 degrees C).

PART 3 EXECUTION

4.1 EXAMINATION

A. Verify that structure is ready for installation of unit, that openings in deck for ductwork, if required, are correctly sized and located, and that mechanical and electrical utilities supplying unit are of correct capacities and are accessible.

4.2 INSTALLATION

A. Provide openings for suitable ductwork connection.

4.3 SYSTEM STARTUP

A. Provide services of manufacturer's authorized representative to provide start up of unit.

4.4 CLEANING

A. Clean filters, air plenums, interior and exposed-to-view surfaces prior to Substantial Completion.

END OF SECTION