

Section 15_ _ _ **Energy Recovery Air Handling System**

Part 1: GENERAL

1.1 Section Includes:

- A. Energy Recovery Air Handler
- B. Controls (most by Others)
- C. Equipment Schedule

1.2 Related Sections:

- A. Section 01655: Starting up mechanical systems
- B. Section 15070: Pipe and pipe fittings
- C: Section 15100: Valves
- D: Section 15120: Piping Specialties
- E: Section 15400: Plumbing System
- F: Section 15990: Testing, adjusting and balancing
- G: Section 16050: Basic electrical materials and methods

1.3 References

- A. **American National Standards Institute (ANSI)** : Establishes requirements applicable to certifying direct gas-fired heaters.
- B. **ETL Testing Laboratories** : Independent testing facility certifies standards conformance.
- C. **American Conference of Governmental Hygienists (ACGIH)** : Establishes air quality standards.
- D. **Environmental Protection Agency (EPA)** : Enforces outdoor air quality standards.
- E. **Occupational Safety & Health Administration (OSHA)** : Enforces air quality standards and safety in the work place.
- F. **National Electric Code (NEC)** : Establishes electrical standards.
- G. **Underwriters Laboratory (UL)** : Independent testing facility certifies component conformance to appropriate standards.
- H. **National Fire Protection Agency (NFPA)** : Establishes fire prevention standards.

1.4 Quality Assurance

- A. Furnish and install an energy recovery air handling unit including all components as shown on plans. The unit shall be completely factory assembled by AbsolutAire (or approved equal) and shall be wired in accordance with the National Electric Code (NEC).
- B. Furnish proof, satisfactory to the owner or his representative, of having manufactured energy recovery ventilation systems for a minimum of five years.
- C. Make its facility available to owner or his representative for quality control audits without prior notification.

1.5 Submittals

- A. Manufacturer shall submit product data, including dimensions, duct & service connections, accessories, controls with schematics and sequence of operation, electrical nameplate data, wiring diagrams, and fan curves and burner & filter data.
- B. Manufacturer shall furnish rigging, assembly, and installation instructions.
- C. Manufacturer shall furnish Operation & Maintenance Manuals, including descriptive literature, operation instructions, maintenance and repair data, and parts listing.

2.1 Acceptable Manufacturers

AbsolutAire, Inc. (Kalamazoo, MI) (800) 804-4000 or sales@absolutaire.com

2.2 Energy Recovery Unit

- A. Provide an air to air plate heat exchanger integral to the unit that will transfer sensible heat from air leaving the controlled space, prior to exhausting it from the building to a supply air stream containing 100% outside air. The heat exchanger must be rated in accordance with ASHRAE Standard 84-91 and ratings must be based on AHRI 1060-2005 certification.
- B. All face velocities across the energy recovery heat exchanger shall be designed for between 400 and 550 FPM. The face velocity shall be constant at all times throughout the operation of the heater except when controlling frost on the supply air side.
- C. Stainless Steel condensate pans will be located on the supply and return air streams positioned to collect moisture from the energy recovery heat exchanger during operation. Condensate pan seams shall be welded and leak checked. A pan drain shall

be routed to the exterior of the unit and include a threaded exterior connection. (P-trap and external drain piping by others)

- D. Provide filtration of all outdoor and return air streams entering the heat exchanger. Polyester media with internal wire frame linked together and running continuously across the full width of the filter housing. This filter shall be 30% efficient and allow no air to bypass around it. Manufacturer shall provide an clogged filter warning light for each filter bank located on the remote control panel.
- E. Provide a casing, which shall be a minimum of 16-gauge aluminized steel; welded and sealed continuously for airtight and watertight construction. Both interior and exterior structural steel shall be gray-oxide primed. All exterior casing seams shall be 100% weather-tight. All interior and exterior surfaces will be cleaned of all oil and grease. Painted exterior will consist of a high-quality catalyzed primer coat and a finish coat of machine enamel with rust inhibitors. Color is may selected by the owner. (All inlet and outlet ducting is by others).
- F. All interior surfaces will be lined with 1 inch thick, 1-1/2 pound density foil-face fiberglass insulation. The insulation shall comply with UL standard 181 for erosion and NFPA 90A for fire resistance and will be held in place with adhesive.
- G. Motorized inlet dampers shall be provided on the inlet of the exhaust fan box and outside air inlet. Parallel blade damper shall be provided in a flange assembly and include a 24-volt direct coupled actuator.
- H. A motorized bypass damper shall be provided to control outside air bypassing the energy recovery heat exchanger in occupied and frost control modes. An opposed blade damper shall be provided including a 24-volt direct coupled actuator.
- I. Provide hinged access doors enclosing maintenance areas with positive latching, watertight handles. All weather enclosure doors shall have foil face insulation adhered to the interior of the door panel(s) and shall include braces that lock the door open during servicing. All remaining service areas will be accessible using gasketed lift out service panels. All access panels shall be fully gasketed positive latching lift out type with rustproof handles and hardware. Foil face insulation will be adhered to the interior of the door panel(s).
- J. Provide a hot water coil constructed of 0.020" thick copper tubes and 0.0060" thick aluminum fins and a galvanized case to provide supplemental heat after the energy recovery heat exchanger. The coil shall have male NPT threaded Schedule 40 pipe connections for both the supply and return stubbed to the exterior of the air handlers housing. All hot water control valves and plumbing specialties shall be by others.
- K. Provide outdoor air velocity across the coil, which shall be constant and between 500 and 800 FPM through the burner profile. The coil velocity shall be constant at all

times throughout the operation of the heater.

- L. The supply fan shall be a Double-Width, Double-Inlet, forward curved design, and belt driven for the required air capacity. The motor shall be premium efficient, mounted on an adjustable slide base and shall be open drip-proof with a safety factor of 1.15. It shall be suitable for continuous service at 120 degrees F ambient temperature, and shall be wired for the selected voltage, 1750 RPM and standard NEMA frame. Blower, motor and drive shall be factory tested to guarantee the specified air delivery (per ANSI standards) at the design total static pressure. Fan shaft shall be connected to the motor by multi V-Belt drive, capacity designed for 130% of the motor nameplate horsepower. Fan shaft shall be of a turned, ground and polished shafting. A protective coating shall be applied to the shaft to minimize oxidation. Bearings shall be Spherical Roller type bearings and shall be designed for an L10 life of 100,000 hours or better. The bearings shall have a labyrinth type seal so they can self-purge any excessive grease.

2.3 Controls

- A. The main control panel shall meet NEMA 1, 2, 3, 3R, 3S, 4, 5 & 12 requirements and contain all standard electrical components, such as non-fused disconnect switch; motor starter; 120-volt and 24-volt transformers; control circuit fuses; and a number-coded terminal strip. The complete control and safety shall be factory tested before shipment and evidence of the factory start up provided with the O&M manual.
- B. Frost control bypass dampers shall be included with controls on the supply air stream. The purpose of these dampers is to open as required to alleviate frost from the “cold corner” on the flat plate heat exchanger.
- C. The space temperature control shall be provided by others to operate the hot water control valve.
- D. A remote control monitoring panel shall be provided which incorporates all heater operating switches and circuit analyzer lights. The remote control panel shall be painted mild steel. Wiring to remote panel from the main control panel shall be accomplished with low voltage (24/120-volt maximum) wiring circuits.
- E. The low-temperature limit switch turns the fan motor off when cold air is being discharged from the heater. The minimum discharge temperature may be selected from 0 degrees to 70 degrees F. An integral timer shall by-pass this switch for five (5) minutes on initial start-up.
- F. Variable Frequency Drives and inverter rated motors shall be supplied with the supply and exhaust fans to vary the air volume between high and low air volumes. High and low modes will be set with a hand switch or remote interlock (depending on plans).

2.4 Accessories - Manufacturer shall provide the following accessories:

- A. A remotely located fan box shall be included with the equipment capable of drawing air through the energy recovery heat exchanger and associated filters and dampers in the main unit. The fan box shall include dampers that open during high air volume mode and allow additional air to enter from the space. (All inlet and outlet ducting is by others).
1. Provide a casing, which shall be a minimum of 16-gauge aluminized steel; welded and sealed continuously for airtight and watertight construction. Both interior and exterior structural steel shall be gray-oxide primed. All exterior casing seams shall be 100% weather-tight. All interior and exterior surfaces will be cleaned of all oil and grease. Painted exterior will consist of a high-quality catalyzed primer coat and a finish coat of machine enamel with rust inhibitors. Color is may selected by the owner. (All inlet and outlet ducting is by others).
 2. All interior surfaces will be lined with 1 inch thick, 1-1/2 pound density foil-face fiberglass insulation. The insulation shall comply with UL standard 181 for erosion and NFPA 90A for fire resistance and will be held in place with adhesive.
 3. Motorized inlet dampers shall be provided on the inlet of the exhaust fan box and outside air inlet. Parallel blade damper shall be provided in a flange assembly and include a 24-volt direct coupled actuator.
 4. A motorized bypass damper shall be provided to control outside air bypassing the energy recovery heat exchanger in occupied and frost control modes. An opposed blade damper shall be provided including a 24-volt direct coupled actuator.
 5. Provide hinged access doors enclosing maintenance areas with positive latching, watertight handles. All weather enclosure doors shall have foil face insulation adhered to the interior of the door panel(s) and shall include braces that lock the door open during servicing. All remaining service areas will be accessible using gasketed lift out service panels. All access panels shall be fully gasketed positive latching lift out type with rustproof handles and hardware. Foil face insulation will be adhered to the interior of the door panel(s).
- B. Discharge Head (where noted on plans)
Manufacturer shall provide double deflection, 360-degree discharge head(s), as detailed on the planes. The head shall be constructed of a minimum of 16-gauge aluminized steel. Adjustable, locking, double deflection blades will be provided to control direction of airflow, both vertically and horizontally. Each discharge head

will be properly cleaned and then prime and finish coat painted to match the heater.
360-degree discharge heads shall be provided with insulation (1" thick 1-1/2# density)
installed on the interior floor area for noise reduction.