

SECTION 237223 - PACKAGED, OUTDOOR, FIXED PLATE ENERGY RECOVERY UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fixed-plate, sensible heat exchangers in packaged, outdoor, energy-recovery units.

B. Related Requirements:

1. Section 237343.16 "Outdoor, Semi-Custom Air-Handling Units" for outdoor, semi-custom air-handling units if they also include coils, other than electric coils for frost control, in addition to fixed-plate heat exchangers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For packaged, outdoor, fixed-plate, energy-recovery units.

1. Include plans, elevations, sections, details, and [mounting] [attachment] details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, lifting requirements, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Paint Samples: For selection of custom finishes

1. Include in submittal data a selection of up to 5 paint finish samples at the owner's request.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Floor plans, [roof plans] elevations, and other details, drawn to scale. and coordinated with each other, using input from installers of items involved.

B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 COORDINATION

- A. Coordinate sizes and locations of building openings and duct connections with actual equipment provided.

1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of packaged, outdoor, fixed-plate, energy-recovery units that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Packaged Energy-Recovery Units: One years from date of Substantial Completion.
 - 2. Warranty Period for Fixed-Plate Heat Exchangers: five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of air-handling units and components.
- B. ASHRAE Compliance:
 - 1. Applicable requirements in ASHRAE 62.1.
 - 2. Capacity ratings for fixed-plate energy-recovery units shall comply with ASHRAE 84.
- C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1.
- D. UL Compliance:
 - 1. Packaged heat-recovery ventilators shall comply with requirements in UL 1815 or UL 1812.
- E. Comply with ASTM E84.

2.2 CAPACITIES AND CHARACTERISTICS

- A. Type: Fixed-plate sensible heat, energy-recovery unit.
- B. Fans:
 - a. Variable speed
- C. Filters:

1. Type: Cleanable wire mesh and Pleated.
2. Maximum or Rated Face Velocity: 500 fpm
3. Initial Resistance: 0.25 in Wg
4. Minimum Efficiency Reporting Value:
 - a. MERV Rating: MERV 13 in accordance with ASHRAE 52.2.

2.3 PACKAGED, OUTDOOR, FIXED-PLATE, SENSIBLE HEAT, ENERGY-RECOVERY UNITS

- A. Source Limitations: Obtain packaged, outdoor, fixed-plate, energy-recovery units from of the following single manufacturers.
 1. Greenheck
 2. Aldes
 3. Renewaïre
- B. Surfaces in Contact with Airstream: Comply with requirements in ASHRAE 62.1.
- C. Housing: Manufacturer's standard construction with corrosion-protection coating and exterior finish, gasketed, hinged access doors with neoprene gaskets for inspection and access to internal parts, minimum 2-inch thick, thermal insulation, knockouts for electrical and piping connections, exterior drain connection, and lifting lugs.
- D. Custom Painted finish: Provide premium, weather resistant painted finish.
 1. Color shall be "Bone White"
- E. Fixed-Plate, Sensible Heat Exchanger:
 1. Casing: Aluminum.
 2. Drain Pan: Same material as casing, with drain connections on exhaust and supply side.
 - a. Comply with requirements in ASHRAE 62.1.
 3. Plates: Evenly spaced, sealed, and arranged for cross-flow.
 - a. Plate Material: Embossed aluminum.
 4. Bypass Plenum: Within casing, with gasketed face-and-bypass dampers having operating rods extended outside casing.
- F. Supply and Exhaust Fans: Forward-curved centrifugal fan with restrained spring isolators of 1-inch (25-mm) static deflection.
 1. Motors and Drives: Direct drives with VFD.

- a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
- b. Motor Sizes: Minimum size as indicated. If size is not indicated, provide motor large enough so driven load will not require motor to operate in service factor range above 1.0.

G. Filters:

1. Description: Cleanable wire mesh at outside air intake and pleated factory-fabricated, self-supported, disposable air filters with holding frames.
2. UL Compliance: Comply with UL 900.
3. Media: Interlaced glass fibers sprayed with nonflammable adhesive.
4. Filter-Mounting Frames: Arranged with access doors or panels on both sides of unit. Filters shall be removable from one side or lift out from access plenum.

H. Wiring: Fabricate units with space within housing for electrical conduits. Wire motors and controls so only external connections are required during installation.

1. Outdoor Enclosure: NEMA 250, Type 3R enclosure contains relays, starters, and terminal strip.
2. Include fused disconnect switches.

2.4 CONTROLS

- A. Control Panel: Solid-state, programmable, microprocessor-based control unit for integration with BAS as specified in Section 230923 "Direct Digital Control (DDC) System for HVAC".]
- B. Starting relay, factory mounted and wired, and manual motor starter for field wiring.
- C. Frost Control: None.
- D. Economizer Control: Fixed-plate airflow bypass. See Section 230923 "Direct Digital Control (DDC) System for HVAC" for control sequence.
- E. Dry-bulb temperature sensor.
- F. Dirty filter switch.
- G. Low-Voltage Transformer: Integral transformer to provide control voltage to unit from primary incoming electrical service.

2.5 SOURCE QUALITY CONTROL

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by NRTL, and marked for intended location and application.

- B. AHRI Compliance: Capacity ratings for air-to-air energy-recovery equipment certified as complying with AHRI 1060 (IP) (AHRI 1061 [SI]).
- C. Fan Performance Rating: Comply with AMCA 211, and label fans with AMCA-certified rating seal. Factory test fan performance for airflow, pressure, power, air density, rotation speed, and efficiency in accordance with AMCA 210 and ASHRAE 51.
- D. Fan Sound Ratings: Comply with AMCA 301 or AHRI 260 (IP) (AHRI 261 [SI]).
- E. UL Compliance:
 - 1. Packaged, Fixed-Plate, Energy-Recovery Units: Comply with requirements in UL 1812.
 - 2. Electric Coils: Comply with UL 1995.

PART 3 - EXECUTION

- 3.1 INSTALLATION OF PACKAGED, OUTDOOR, FIXED-PLATE, ENERGY-RECOVERY UNITS
 - A. Examine casing insulation materials and filter media before packaged, outdoor, fixed-plate, energy-recovery unit installation. Replace insulation materials and filter media that are wet, moisture damaged, or mold damaged.
 - B. Install packaged, outdoor, fixed-plate, energy-recovery units, so supply and exhaust airstreams flow in opposite directions.
 - 1. Install access doors in both supply and exhaust ducts, both upstream and downstream, for access to interior components.
 - 2. Install removable panels or access doors between supply and exhaust ducts on building side for bypass during startup.
 - 3. Access doors and panels are specified in Section 233300 "Air Duct Accessories."
 - C. Equipment Mounting:
 - 1. Install roof-mounted packaged, outdoor, fixed-plate, energy-recovery units on manufacturer's-recommended-height equipment roof curbs. Comply with requirements on Architectural Drawings 03/A5.4
 - 2. Comply with requirements for vibration-isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."
 - D. Install units with clearances for service and maintenance.
 - E. Do not operate equipment fans until temporary or permanent filters are in place. Replace temporary filters used during construction and testing with new, clean filters prior to final inspection.

3.2 DUCTWORK CONNECTIONS

- A. Comply with requirements for ductwork in accordance with Section 233113 "Metal Ducts."
- B. Connect duct to units with flexible connections. Comply with requirements in Section 233300 "Air Duct Accessories."
- C. Isolation Dampers: Install isolation dampers in accordance with Section 230923.12 "Control Dampers."

3.3 PIPING CONNECTIONS

- A. Where installing piping adjacent to unit, allow for service and maintenance.
- B. Connect piping to units mounted on vibration isolators with flexible connectors.
- C. Condensate Drain Piping: See Section 232113 "Hydronic Piping" for pipe type. Install condensate drain piping from drain pans to nearest roof drain, same size as condensate drain connection.
 - 1. Construct deep trap at connection to drain pan, and install cleanouts at changes in direction.

3.4 ELECTRICAL CONNECTIONS

- A. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.
- B. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."
- D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.
 - 1. Nameplate shall be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
 - 2. Nameplate shall be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch (13 mm) high.

3.5 CONTROL CONNECTIONS

- A. Install control and electrical power wiring to field-mounted control devices.

- B. Connect control wiring in accordance with Section 260523 "Control-Voltage Electrical Power Cables."

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage qualified testing agency to perform tests and inspections.
- C. Perform tests and inspections with assistance of factory-authorized service representative.
- D. Tests and Inspections:
 - 1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Packaged, outdoor, fixed-plate, energy-recovery units will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

3.7 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain air-to-air energy-recovery units.

END OF SECTION 237223

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