**Price RegenCore™ Alternating Mass Exchanger Energy Recovery Units**

**Division 23 – Heating, Ventilating, and Air Conditioning**

**Section 23 72 00 – Air-to-Air Energy Recovery Equipment**

The following specification is for a defined application. Price would be pleased to assist in developing a specification for your specific need.

**PART 1 – GENERAL**

* 1. **Section Includes:**
		1. RegenCore™ Alternating Mass Exchanger Energy Recovery units

**1.02 Related Requirements:**

## Section 23 05 13 - Common Motor Requirements for HVAC Equipment

* + 1. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment
		2. Section 23 09 13 - Instrumentation and Control Devices for HVAC: Control components, time clocks
		3. Section 23 33 00 - Air Duct Accessories: Flexible duct connections
		4. Section 23 34 16 - Centrifugal HVAC Fans: Supply fans
		5. Section 23 40 00 - HVAC Air Cleaning Devices: Filters
		6. Section 26 27 17 - Equipment Wiring: Electrical characteristics and wiring connections

# 1.03 Reference Standards

1. All referenced standards and recommended practices in this section pertain to the most recent publication thereof, including all addenda and errata.
2. AMCA 500-D – Laboratory Methods of Testing Dampers for Rating
3. AMCA 511 – Damper Certified Ratings Program – Product Rating Manual for Air Control Devices
4. ASHRAE 62.1 – Standards for Ventilation and Indoor Air Quality
5. ANSI/AHRI 1350 - Mechanical Performance Rating of Central Station Air-handling Unit Casings
6. ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus
7. ASTM D610 – Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces
8. ASTM D714 – Standard Test Method for Evaluating Degree of Blistering of Paints
9. ASTM D1308 – Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
10. ASTM D4752 – Standard Practice for Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub
11. UL 900 – Standard for Air Filter Units

# Administrative Requirements

# Pre-installation Meeting: Contractor shall conduct a pre-installation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

# Sequencing: Contractor shall ensure that utility connections are achieved in an orderly and efficient manner.

# Submittals

* + 1. See Section 01 30 00 - Administrative Requirements for submittal procedures.
		2. Product Data:
			1. Provide data indicating dimensions, duct and service connections, accessories, controls, electrical nameplate data, and wiring diagrams.
			2. The performance schedule shall include the following information (**select all that apply**):
				1. Unit weight
				2. Electrical Characteristics
		3. Shop Drawings:
			1. Provide general layout drawings with plan and elevation views including relevant dimensions to include duct, piping, and electrical service connection locations for the following items:
				1. Provide roof curb mounting details.
				2. Provide electrical schematics including field wiring connections.
				3. Provide component details including construction method and materials.

# 1.06 Quality Assurance

* + 1. Manufacturer Qualifications:
			1. The manufacturer shall be a company specializing in manufacturing the type of products specified in this section, with a minimum of 5 years of documented experience.
		2. The unit shall bear certification label by ETL, UL, or CSA.

# 1.07 Inspection, Storage, and Rigging

* + 1. Inspection:
			1. The unit shall be inspected immediately upon delivery to ensure there is no apparent physical damage.
			2. Any damage claims should be filed immediately with the carrier.
			3. The manufacturer shall not assume responsibility for damage caused during shipment, handling, storage and rigging.
		2. Storage:
			1. Equipment shall be stored in the original factory shipping packaging away from construction areas where it will be safe from damage and protected from harmful weather conditions.
			2. Factory shipping packaging shall remain in place until unit is ready to be installed.
			3. The make-up air unit is not to be used for temporary heating, cooling or ventilation during construction. Doing so will void the terms of the equipment warranty.
		3. Rigging:
			1. Follow manufacturer’s instructions for rigging and placement of equipment.

# 1.08 Coordination

* + 1. Coordinate all system connections and building penetrations including electrical and duct connections.
		2. Coordinate curb placement, structural and roofing.

# 1.09 Warranty

* + 1. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
		2. The manufacturer will provide a parts only warranty of 12-month from startup or 18-months from shipping, whichever comes first.

**PART 2 – PRODUCTS**

**2.01 General**

1. Basis of Design: Price Industries, Inc.
2. High Effectiveness Energy Recovery Unit [Price Model PRC]
3. Light Duty High Effectiveness Energy Recovery Unit [Price Model PRCLC]
4. General Product Information:
5. Furnish and install Price [PRC] or [PRCLC] energy recovery units, as indicated on the plans with capacities and characteristics as listed in the schedule and the specifications that follow.

**2.02 Performance**

1. General:
	1. The energy recovery units shall provide the performance as detailed on the schedule.
2. [Optional] Variable Air Volume:
	* + 1. The energy recovery unit shall operate with air flow rates as low as 20% of the nominal unit airflow.
			2. Supply and exhaust airflows shall be capable of being unbalanced up to 50%.

## 2.03 Construction

The cabinet shall use [Choose one: Thermoshield construction (Models PRC1000 to PRC12500) or Post and Panel construction (all models)].

 **Thermoshield** **(Models PRC1000 to PRC12500)**

1. General:
2. The units casing shall be designed for sustainable developments with a long lasting service life. It shall:
	1. Include recycled and recyclable material.
	2. Be light in weight and high in strength.
	3. Support low energy loss.
	4. Be fire resistant.
	5. Have a high degree of UV reflectivity.
	6. Be resistant to corrosion.
	7. Be air tight.
	8. Be manufactured for low VOC production.
3. Cabinet Material:
4. The entire cabinet with the exception of hinges and hardware shall be constructed of marine grade aluminum.
5. The entire cabinet shall reduce galvanic corrosion within the system by:
	1. Minimizing the use of dissimilar metals.
	2. Ensuring anodic materials are larger in surface area than contacted cathodic materials.
6. Both external and internal steel supports are not permitted.
7. Cabinet Construction:
8. All areas of the unit in contact with treated air shall have double wall construction, with a marine grade aluminum liner.
9. The unit frame and panel components shall be constructed with a double thermal break. The balance to be at minimum a single thermal break.
10. The cabinet will be designed to minimize fastener penetration through the inner and outer wall. Through penetrations that cannot be eliminated shall be water sealed on the outer wall and vapor sealed on the inner wall.
11. The unit shall include an integral base constructed from marine grade aluminum and include lifting points.
12. [Optional] The unit will be designed with a sloped roof in the **[insert section(s)]** to prevent water pooling.
13. Finish
	1. All marine grade aluminum cabinet surfaces shall be unpainted.
14. Insulation:
	* + 1. The cabinet insulation shall have the following characteristics:
				1. The insulation R-value shall be a minimum of R14.
				2. The insulation shall have a flame spread and smoke development index of 0, when tested according to ASTM E84, CAN/ULC S102, and UL723.
				3. The insulation shall be chemically inert, water resistant, and shall not rot or sustain vermin.
				4. The insulation shall be corrosion resistant when tested according to ASTM C795 and ASTM C665
				5. The insulation shall not promote the growth of fungi or mildew, when tested according to ASTM C1338.
				6. The insulation shall display low moisture sorption when tested according to ASTM C1104.
				7. The insulation shall have a VOC content of 0, and shall be non-off-gassing.
				8. The insulation shall include recycled content.
15. Component Access:
	* + 1. Units shall be designed so that all components can easily be removed through access doors and removable panels, with the exception of heating components.
			2. Dismantling of the structural components of the unit shall not be required for component service or replacement with the exception of heating components.
			3. All access doors and removable panels on the air handling section shall be gasketed and close against positive pressure.
				1. [Optional] All access doors and removable panels will include a pressure relief latch.
16. Drain Pan:
	* + 1. The units shall be supplied with cleanable, positive draining, drain pan(s).
			2. The drain pan(s) shall be marine grade aluminum. Alternative materials shall not be acceptable in order to prevent the potential for galvanic corrosion.
			3. The drain pan(s) shall be designed as necessary to prevent carryover of water droplets beyond the drain pan to 0.0044 oz/ft2 (1.5 mL/m2) of face area per hour under peak sensible and peak dew-point conditions, accounting for both latent load and a coil face velocity 20% above the design velocity.
17. Hardware:
	* + 1. All hardware, hinges, handles and fasteners shall be non-corrosive.
			2. All external hardware, handles and fasteners, shall be non-corrosive [aluminum], [300 series stainless steel] or [plastic].
			3. All internal fasteners used on insulated panels shall be non-corrosive [aluminum] or [300 series stainless steel].
18. Electrical Panels:
19. All electrical panels located in the air handler shall have sealed and insulated doors.

**Post and Panel (all models)**

1. Cabinet Construction:
2. The cabinet shall be fabricated from panels mechanically fastened to extruded aluminum posts.
3. All doors and panels shall be sealed with a permanent bulb-type EPDM rubber gasket.
4. The cabinet shall be built up on a steel channel base, engineered to prevent deflection during rigging. Lifting lugs shall be [welded] or [bolted].
5. [**For outdoor applications only**] The posts shall have a thermally-broken construction with hermetic seals between posts and joints to minimize energy losses.
6. Panels:
	* + 1. Panels shall be 2 inch nominal thick construction.
			2. The outer panel shall be constructed of painted 20 gauge steel, and the inner liner shall be constructed of 20 gauge galvanized steel. Panels shall be removable without affecting the structural integrity of the entire unit.
			3. Roof panel construction shall match the wall panel construction. The roof skin shall include a 1-1/2 inch standing seam with a rain-guard drip-edge around the full perimeter.
			4. [**For outdoor applications only**] The panels shall be a double-wall assembly for outdoor applications, with injected polyurethane foam insulation.
				1. Panels shall be of a thermally-broken construction, as required.
				2. The polyurethane foam insulation shall be in accordance with the following:

The insulation shall have a flame spread and smoke development index of 0, when tested according to ASTM E84, CAN/ULC S102, and UL723.

The insulation shall be chemically inert, water resistant, and shall not rot or sustain vermin.

The insulation shall be corrosion resistant when tested according to ASTM C795 and ASTM C665

The insulation shall not promote the growth of fungi or mildew, when tested according to ASTM C1338.

The insulation shall display low moisture sorption when tested according to ASTM C1104.

The insulation shall have a VOC content of 0, and shall be non-off-gassing.

1. Access Doors:
	* + 1. Access doors shall be 2 inch nominal thick construction, and shall be flush, hinged and supplied with handles.
2. Finish:
3. All exterior galvanized steel shall be coated with a weather resistant paint, capable of withstanding surface degradation and substrate corrosion after at least 1500 hours of salt spray exposure (per ASTM B117).

# 2.04 Components

* + 1. Supply/Return Fans:
			1. The energy recovery unit shall be provided with direct-drive airfoil plenum supply and return fans. The fan assemblies shall be dynamically balanced and selected at speed below critical RPM.
			2. The fan and motor shall be mounted internally on a steel base-frame complete with spring vibration type isolators. The unit casing shall include a hinged access door to permit access to the motor, drive, and bearings.
			3. The motor shafts shall be steel construction, and shall be solid, ground and polished, keyed, and protectively coated with lubricating oil. Hollow shafts shall not be acceptable.
		2. Electrical:
			1. The air handler shall bear an ETL, UL, or CSA listing label. The electrical components shall be CSA, UL or CE listed, as applicable.
			2. The unit shall be supplied with a single point power supply connection.
			3. Terminal lugs shall be provided in accordance with the branch circuit conductor quantities, sizes, and materials indicated.
			4. All wires shall be tagged and cross-referenced to the wiring diagram for ease of troubleshooting.
			5. Fan motors shall be premium efficiency totally-enclosed fan-cooled (TEFC), driven with a variable-frequency drive (VFD). Electrical characteristics shall be as shown in the equipment schedule.
		3. Filters:
1. The unit shall be supplied with filters supported in racks, which shall be accessible through hinged and latching access-doors on at least one side of the unit.
2. The filter media shall be UL 900 listed, Class I or Class II.
3. Filters shall be mounted in a flat or angled arrangement with [2 inch, 50 millimeter] or [4 inch, 100 millimeter] pleated panel filters.
	* 1. Energy Recovery Cores:
			1. Unit shall be equipped with Price RegenCore™ Energy Recovery Technology. The unit shall have sensible effectiveness of 90 percent (plus or minus 5 percent) in winter and up to 80 percent in summer. The unit shall also provide up to 70 percent latent recovery.
			2. Unit shall accomplish energy recovery without a defrost cycle down to -40 degrees Fahrenheit (-40 degrees Celcius). Devices employing defrost cycles that bypass the heat recovery device or reduce the effectiveness shall not be acceptable.
			3. The energy recovery cores shall consist of 0.032 inch thick type 1100 aluminum alloy plates.
		2. Dampers:
			1. The unit shall be supplied with a switchover damper system comprised of four multi-section, low-leakage, AMCA certified dampers.
			2. The dampers shall meet the following requirements:
				1. AMCA Leakage Class 1A at 1 inch water gauge static pressure differential.
				2. AMCA Leakage Class 1 at 4 inches water gauge static pressure differential.
			3. The dampers shall be operated by CSA-listed electric motors. The motors shall drive the dampers full-open to full-closed and full-closed to full-open in less than 0.75 seconds.
			4. The damper blades shall be aluminum for long life expectancy, and shall be insulated and thermally-broken dampers, as required to meet the job requirements.
			5. The switchover damper system shall be capable of closing off outside-air to the building without needing additional shut-off dampers. Energy recovery units employing single‑blade dampers shall include external shut-off dampers.
			6. The unit dampers shall be capable of positioning to allow 100 percent recirculation of air without using the heat recovery device for off-peak or unoccupied heating modes. Units incapable of these operations shall not be acceptable.

# 2.05 Controls

* + 1. Microprocessor-Based Controls:
			1. The unit shall have a Carel microprocessor control system designed to provide precision dew point and dry bulb control by controlling the variable capacity cooling, variable capacity reheat and the variable capacity heat (if required).
			2. The controller shall have a backlit LCD screen and shall be menu driven. The screen commands and outputs shall be in plain English. Alpha Numerical codes shall not be acceptable.
			3. The controller shall have battery back-up protecting all user settings in the event of a power outage.
			4. The controller shall work in ambient conditions from 10 to 125 °F (-12 to 52 °C) and 95% relative humidity (RH) non-condensing.

# PART 3 EXECUTION

**3.01 Installation**

* + 1. The energy recovery unit shall be installed in accordance with the manufacturer's installation instructions and all applicable building codes.

# Environmental Requirements

* + 1. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

# 3.03 Maintenance

* + 1. Refer to Section 01 70 00 - Execution and Closeout Requirements for additional requirements relating to maintenance service.
		2. A separate maintenance contract shall be provided for specified maintenance service.