Systemair Inc. June 2024

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Product Guide Specification

Specifier Notes: This product guide specification is written according to the Construction Specifications Institute (CSI) 3-Part Format, including *MasterFormat, SectionFormat,* and *PageFormat,* as described in *The CSI Construction Specifications Practice Guide.*

This section must be carefully reviewed and edited by the Architect or Engineer to meet the requirements of the project and local building code. Coordinate this section with other specification sections and the Drawings. Delete all “Specifier Notes” after editing this section.

Section numbers and titles are from *MasterFormat 2012 Update.*

1. 23 72 13

HEAT-WHEEL AIR-TO-AIR ENERGY RECOVERY EQUIPMENT

Specifier Notes: This section covers Systemair Inc. “ERV RT-EC Series” ducted heat recovery ventilators. Consult Systemair Inc. for assistance in editing this section for the specific application.

* 1. GENERAL
		1. SECTION INCLUDES
			1. Ducted heat recovery ventilators.
		2. RELATED REQUIREMENTS

Specifier Notes: Edit the following list of related sections as necessary. Limit the list to sections with specific information that the reader might expect to find in this section, but is specified elsewhere. Include section number and title.

* + - 1. Section 23 08 00 – Commissioning of HVAC.
		1. REFERENCE STANDARDS

Specifier Notes: List standards referenced in this section, complete with designations and titles. Delete standards not included in the edited section. Including a standard in this list does not require compliance with that standard.

* + - 1. ANSI/AHRI 1060 – Performance Rating of Air-to-Air Heat Exchangers for Energy Recovery Ventilation Equipment.
			2. ANSI/AMCA 300 – Reverberant Room Method for Sound Testing of Fans.
			3. ASHRAE 84 – Method of Testing Air-to-Air Heat Exchangers.
			4. ASTM A 792/A 792M – Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
			5. CSA C22.2, No. 77 – Motors with Inherent Overheating Protection.
			6. CSA C22.2, No. 100 – Motors and Generators.
			7. CSA C22.2, No. 113 – Fans and Ventilators.
			8. CSA C22.2, No. 236 – Heating and Cooling Equipment.
			9. ISO 9001:2008 – Quality Management Systems – Requirements.
			10. NFPA 70 – National Electrical Code (NEC).
			11. UL 723 – Standard for Test for Surface Burning Characteristics of Building Materials.
			12. UL 900 – Standard for Air Filter Units.
			13. UL 1004-1 – Standard for Rotating Electrical Machines - General Requirements.
			14. UL 1004-2 – Standard for Impedance Protected Motors.
			15. UL 1004-3 – Standard for Thermally Protected Motors.
			16. UL 1004-7 – Standard for Electronically Protected Motors.
			17. UL 1812 – Standard for Ducted Heat Recovery Ventilators.
			18. UL 2111 – Standard for Overheating Protection for Motors.
		1. PREINSTALLATION MEETINGS

Specifier Notes: Edit preinstallation meetings as necessary. Delete if not required.

* + - 1. Convene preinstallation meeting [1 week] [2 weeks] before start of installation of energy recovery ventilators.
			2. Require attendance of parties directly affecting work of this section, including Contractor, Architect, Engineer, installer, and manufacturer’s representative.
			3. Review materials, preparation, installation, adjusting, demonstration, protection, and coordination with other work.
		1. SUBMITTALS

Specifier Notes: Edit submittal requirements as necessary. Delete submittals not required.

* + - 1. Comply with Section 01 33 00 – Submittal Procedures.
			2. Product Data: Submit manufacturer’s product data, including preparation and installation instructions.
			3. Shop Drawings: Submit manufacturer’s shop drawings, including plans, elevations, sections, and details.
				1. Wiring Diagrams: Indicate wiring for each item of equipment and interconnections between items of equipment.
				2. Include manufacturer’s names, model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
			4. Manufacturer’s Certification: Submit manufacturer’s certification that energy recovery ventilators comply with specified requirements and are suitable for intended application.
			5. Manufacturer’s Project References: Submit manufacturer’s list of successfully completed air handling unit projects, including project name and location, name of architect and engineer, and type and quantity of air handling units furnished.
			6. Installer’s Project References: Submit installer’s list of successfully completed air handling unit projects, including project name and location, name of architect and engineer, and type and quantity of air handling units installed.
			7. Operation and Maintenance Data:
				1. Submit manufacturer’s operation and maintenance manual; including the following:

Operation, maintenance, adjustment, and cleaning instructions.

Troubleshooting guide.

Parts list.

Electrical wiring diagrams.

* + - * 1. Provide detailed information required for Owner to properly operate and maintain equipment.
			1. Warranty Documentation: Submit manufacturer’s standard warranty.
		1. QUALITY ASSURANCE
			1. Manufacturer’s Qualifications:
				1. Manufacturer regularly engaged, for past 5 years, in manufacture of air handling units of similar type to that specified.
				2. ISO 9001 certified company.
			2. Installer's Qualifications:
				1. Installer regularly engaged, for past 5 years, in installation of air handling units of similar type to that specified.
				2. Employ persons trained for installation of air handling units.
		2. DELIVERY, STORAGE, AND HANDLING
			1. Delivery Requirements: Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
			2. Storage and Handling Requirements:
				1. Store and handle materials in accordance with manufacturer’s instructions.
				2. Keep materials in manufacturer’s original, unopened containers and packaging until installation.
				3. Store materials in clean, dry area indoors.
				4. Protect materials during storage, handling, and installation to prevent damage.
		3. WARRANTY
			1. Warranty Period: 3 years.
	1. PRODUCTS
		1. MANUFACTURER
			1. Systemair Inc., 10048 Industrial Blvd. Lenexa, KS 66215, USA. Website [www.systemair.net](http://www.systemair.net). E-mail sales@systemair.net.
		2. DUCTED HEAT RECOVERY VENTILATORS
			1. Ducted Heat Recovery Ventilators: “ERV RT-EC Series”.

Specifier Notes: Specify required model. Consult Systemair Inc. for assistance in determining energy recovery ventilator model for the specific application.

* + - * 1. Model: ERV1300 RT-EC

ERV3200 RT-EC

ERV4600 RT-EC

* + - 1. General:
				1. Each Unit or Group of Units: Capable of operating in any mode independently or dependently of other systems.
				2. Capable of changing modes with no interruption to system operation.
				3. Listed under UL 1812.
				4. Wiring: NFPA 70.
				5. Performance: As scheduled on the Drawings.
				6. Perform all functions necessary for operation.
				7. Capable of operating in winter and summer conditions without imbalance or loss of ventilation capacity greater than specified in design.
				8. No condensate pans or drain lines are allowed.
			2. Unit Cabinet:
				1. Cabinet Exterior: 20-gauge sheet steel. All exposed surfaces shall be coated with baked powder paint.
				2. Double-Wall Cabinet Interior:

20-gauge sheet galvanized steel, G90.

Seams: Sealed, requiring no caulking in field.

* + - * 1. Insulation within Double Wall:

1-inch (25-mm) fiberglass.

Flame Spread Index, UL 723: Not over 25.

Smoke Developed Index, UL 723: Not over 50.

* + - * 1. Provisions for field installed pre-heater system.
			1. Fans:
				1. Direct-drive, backward-inclined, motorized impellers.
				2. Fan Motors:

Maintenance-free, permanently lubricated, sealed ball bearings.

Thermal overload protected (TOP).

UL listed to UL 1004-1, 1004-2, 1004-3, 1004-7 and/or UL 2111; CSA C22.2, No. 77 and No.100.

IP Protection: Class 44 or 54.

Electronically commutated “EC” to maximize efficiency at different speeds.

Mounted for quiet operation.

* + - * 1. Separate fans for exhaust and supply blowers.
			1. Energy Recovery Wheel:
				1. Rotor Matrix: Corrosion-resistant aluminum alloy, composed of alternating corrugated and flat, continuously wound layers of uniform width that guarantee laminar air flow and low static pressure loss.
				2. Counter-flow construction type.
				3. Free cooling capacity.
				4. Performance: Certified and listed by AHRI.
				5. Rotor Wheel: 8-inch-thick wheel reinforced with spokes, welded at hub and perimeter to prevent uneven run-out during normal operations.
				6. Corrugated Surfaces: Coated with thin, non-migrating, adsorbent, Zeolite particles.
				7. Effectiveness of Wheel: Documented in accordance with ASHRAE 84 and AHRI 1060.
				8. Flame Spread Index, Energy Recovery Wheel, UL 723: Not over 25.
				9. Smoke Developed Index, Energy Recovery Wheel, UL 723: Not over 50.
			2. Air Filters:
				1. Outdoor air protected by MERV13 pleated filter constructed to meet UL 900.
				2. Return air protected by MERV8 pleated filter constructed to meet UL 900.
				3. [OPTIONAL] Dirty filter differential pressure sensor.
			3. Energy Recovery Wheel Frost Control [CHOOSE ONE FROST CONTROL]- Electric Pre-Heater:
				1. Enables unit to perform in extremely cold climates to preserve performance and ensure continuous supply of air.
				2. Designed to keep temperature above frost threshold, while remaining within temperature range of unit.
				3. Electric Heater Regulators: SCR fully modulating output control and proof of airflow indicator.
				4. The pre-heater shall have an adjustable set-point (default 7°F [-14°C]) for the leaving air temperature into the energy recovery wheel.
				5. Temperature Limiting Switches.
			4. Energy Recovery Wheel Frost Control [CHOOSE ONE FROST CONTROL]- Timed Exhaust Only Defrost Cycle:
				1. Timed exhaust frost control only applies with the units that have the Corrigo controller in which the supply fan will shut down to maintain an exhaust temperature that will keep the wheel above the frost or condensation threshold. Thus, incoming outdoor air to the supply duct is intermittently paused,outdoor air damper will be closed, while the extracted air warms the energy recovery wheel. Timed Exhaust Only Defrost Cycle sequence needs to be turned on in the Corrigo programming.
				2. 4 stages of supply fan shut down follow a programmed schedule (Table 1) at exhaust air temperatures: 0°C, -5°C, -8°C, and -10°C with progressively longer off/on times pre-determined to protect the energy recovery wheel from frost build up.
				3. The wheel maintains rotation during all stages of the sequence.

Table 1: Timed Exhaust Only Defrost Sequences

|  |  |  |  |
| --- | --- | --- | --- |
| Stages | Exhaust air temperature | Run time | Defrost time |
| 1 |  32°F (0°C) | 24 min | 8 min |
| 2 | 23°F (-5°C) | 21 min | 9 min |
| 3 | 18°F (-8°C) | 18.5 min | 10 min |
| 4 | 14°F (-10°C) | 16.5 min | 11 min |

**Note**: The units with no Corrigo controller (DDC) shall be equipped with Low Ambient Frost Control (LAFC) sequence when exhaust air temperatures drop below 32°F (0°C) as to prevent the wheel from frost or condensation.

* + - 1. Electrical:
				1. Electrical Power: 208-230 VAC, [3 phase] [1 phase], 60 Hz with neutral line.
				2. Electrical Power: 460 VAC, 3-phase, 60 Hz with neutral line.
				3. [OPTIONAL] Controlled by integral microprocessor controller.
				4. Supplied with 24V control transformer.
				5. Electrical Box:

Protect integral wires and connections.

[OPTIONAL] Integral controller mounted inside electrical box free from airstreams.

* + - 1. Serviceability:
				1. Access Panel: Screwed access panel on front of unit.
				2. Energy Recovery Wheels, Filters, and Motors: Serviceable from front of unit.
				3. Fan Assemblies: Mounted on removable base.
				4. Energy Recovery Wheels and Filters: Mounted on slide-out rails.
		1. DUCTED HEAT RECOVERY VENTILATOR CONTROLS
			1. General:
				1. The unit shall be DDC ready with a control strip labeled for each controllable component ready for field mounted controls by others.
				2. [OPTIONAL] A native BACnet, fully programmable, direct digital controller shall be supplied and installed by the factory. The controller shall be programmed to operate the ventilator and be site ready to be connected to a BACnet compatible head end.
				3. The controller must also be able to run standalone and occupancy determined by an internal weekly and annual schedule.
				4. The controller must be capable of supporting remote controllers, schedule timers, system controllers, centralized controllers, integrated web-based interface, graphical user workstation, and system integration to Building Management Systems via BACnet.
			2. Remote Controller Interface:
				1. The controller must also include a remote interface that can be wall or unit mounted. This display will provide the operator the ability to display program set points, provide and occupancy override and display temperatures on an LCD display.
				2. [OPTIONAL] CO2 sensor will be built into the remote interface to display the zone CO2 level.
				3. [OPTIONAL] Occupancy sensor will be built in with the remote interface.
				4. [OPTIONAL] Humidity sensor will be built in with the remote interface.
			3. Sensors:
				1. Temperatures sensors shall also be installed with the controller by the manufacturer: (supply, return, exhaust, incoming).
				2. [OPTIONAL] A wheel rotation sensor shall be supplied and monitored by the controller and will alarm when the wheel stops rotation outside of normal operating conditions.
				3. [OPTIONAL] A dirty filters sensor shall be supplied and monitored by the controller and will alarm when either supply or exhaust air filters reach a differential pressure limit (default 1.0 in. W.c.).
				4. [OPTIONAL] When a factory supplied electric pre-heater is included, it shall be equipped with a high temperature limit sensor.
			4. Alarms:
				1. The controller shall report any alarms to the BMS system.
				2. In standalone operation, the remote interface shall display any alarm conditions.
		2. ASSEMBLY
			1. Factory assemble and wire ducted heat recovery ventilators.
		3. SOURCE QUALITY CONTROL
			1. Run test at factory.
	1. EXECUTION
		1. EXAMINATION
			1. Examine areas and supporting structure to receive ducted heat recovery ventilators.
			2. Notify Architect of conditions that would adversely affect installation or subsequent use.
			3. Do not begin installation until unacceptable conditions are corrected.
		2. PREPARATION
			1. Prepare surfaces where ducted heat recovery ventilators are to be mounted.
			2. Ensure surfaces are flat, level, plumb, and can support weight of ducted heat recovery ventilators.
		3. INSTALLATION
			1. Install ducted heat recovery ventilators in accordance with manufacturer’s instructions at locations indicated on the Drawings.
			2. Install ducted heat recovery ventilators in accordance with NFPA 70.
			3. Install ducted heat recovery ventilators level, plumb, and secure.
			4. Do not expose electronic components to temperatures below 32 degrees F (0 degrees C) or above 122 degrees F (50 degrees C).
		4. ADJUSTING
			1. Adjust ducted heat recovery ventilators for proper operation in accordance with manufacturer’s instructions.
		5. DEMONSTRATION
			1. Demonstration:
				1. Demonstrate that ducted heat recovery ventilators function properly in every respect.
				2. Perform demonstration at final system inspection by factory-trained and certified representative of manufacturer.
			2. Instruction and Training:
				1. Provide instruction and training of Owner’s personnel as required for operation and maintenance of ducted heat recovery ventilators.
				2. Provide hands-on demonstrations of operation of system components and complete system, including user-level program changes and functions.
				3. Provide instruction and training by factory-trained and certified representative of manufacturer.
		6. PROTECTION
			1. Protect installed ducted heat recovery ventilators from damage during construction.

END OF SECTION