METROLINX

Capital Projects Group

Energy Recovery Ventilators Specification

Specification 23 33 65

Revision 1
Date: September 2018

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Amendment Record Sheet

Amendment in Clause No.	Date of Amendment	Description of Changes
Various	Sept. 20, 2018	Revised to coordinate with corresponding specifications.

LIST OF CONTENT

1. GENERAL

1.1. SCOPE OF WORK

1.1.1. Provide energy recovery ventilators as required, scheduled and specified herein.

1.2. DESIGN REQUIREMENTS

1.2.1. Design requirements are based on Part 2 specified requirements of products.

1.3. RELATED WORKS

1.3.1. Section 20 05 05 - Mechanical Work General Instructions.

1.3.2. Section 20 05 10 - Basic Mechanical Materials and Methods.

1.3.3. Section 20 05 40 – Mechanical Work Commissioning.

1.3.4. Section 23 20 00 HVAC Piping and Pumps.

1.3.5. Section 22 13 00 - Drainage and Vent Piping and Specialties.

1.4. REFERENCE STANDARDS

1.4.1. Standards and codes to be latest editions adopted by and enforced by local governing authorities.

1.4.2. ANSI/AMCA Standard 210, Laboratory Method of Testing Fans for Certified Aerodynamic Performance Rating.

1.4.3. AMCA Standard 211, Product Rating Manual for Fan Air Performance.

1.4.4. ANSI/AMCA Standard 300, Reverberant Room Method for Sound Testing of Fans.

1.4.5. AMCA Standard 311, Product Rating Manual for Fan Sound Performance.

1.4.6. AMCA Standard 99-2408, Operating Limits for Centrifugal Fans.

1.4.7. AMCA Standard L 500 Laboratory Methods of Testing Louvers for Rating.

1.4.8. AHRI Standard 410, Forced-Circulation Air-Cooling and Air-Heating Coils.

1.4.9. AHRI Standard 1060, Performance Rating of Air-to-Air Exchangers for Energy Recovery Ventilation Equipment.

1.4.10. ASHRAE 84, Method of Testing Air-to-Air Heat/Energy Exchangers.

1.4.11. ASTM A53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

1.4.12. CAN/ULC S102, Surface Burning Characteristics of Building Materials and Assemblies.

1.4.13. UL 1812, Ducted Heat Recovery Ventilators.

1.4.14. CSA or ETL certification for all electrical components.

1.5. SPARE PARTS

1.5.1. Supply a spare filter set for each ventilator and store at site where directed prior to Substantial Performance of the Work.

1.6. TRAINING

1.6.1. Training is to be a full review of all components including but not limited to a full operation and maintenance demonstration, with abnormal events.

1.6.2. Include for 3 training sessions of maximum 7 hours duration per session for 7 Metrolinx people per session.

1.6.3. Refer to Section 20 05 05 for additional general requirements.

1.7. WARRANTY

1.7.1. Products to be guaranteed by manufacturer, for a minimum of 2 years after acceptance by Metrolinx.

1.7.2. Submit a signed extended warranty direct from manufacturer to Metrolinx covering the energy recovery wheel from material and workmanship defects for an additional 3 years after Contract warranty expires.

1.8. DELIVERY, STORAGE AND HANDLING

1.8.1. Handle and store products in accordance with manufacturer's instructions, in locations approved by Metrolinx. Include one copy of these instructions with product at time of shipment.

1.9. SUBMITTALS

1.9.1. Refer to submittal requirements in Section 20 05 05.

1.9.2. Submit with delivery of each unit a copy of the factory inspection report, and include a copy of each report with O & M Manual project close-out data.

1.9.3. Submit a site inspection and start-up report from manufacturer’s representative as specified in Part 3 of this Section.

1.9.4. Supply reviewed copies of ventilator/curb assembly shop drawings or product data to trade who will cut roof openings for ventilators, and ensure openings are properly located.

1.9.5. Submit shop drawings/product data sheets as follows:

a) to regulatory authority for review and approval prior to submitting to Consultant;

b) for ventilators, including accessories, and all required power and control wiring schematics;

c) copies of all calculations, stamped and signed by same engineer who signs layout drawings, and a listing of all design data used in preparing the calculations, system layout and sizing requirements.

1.9.6. Product Data

a) Submit product data sheets indicating:

1) technical data, supplemented by bulletins, component illustrations, detailed views, technical descriptions of items, and parts lists;

2) performance criteria, compliance with appropriate reference standards, characteristics, limitations, and troubleshooting protocol;

3) product transportation, storage, handling, and installation requirements;

4) product identification in accordance with Metrolinx requirements.

1.9.7. Shop Drawings

a) Submit shop drawings indicating:

1) capacity and ratings;

2) mounting details to suit locations shown, indicating methods and hardware to be used;

3) applicable control components and control wiring schematic.

1.9.8. Commissioning Package

a) Submit the following in accordance with Sections 20 05 05 and 20 05 40:

1) Commissioning Plan;

2) Commissioning Procedures;

3) Certificate of Readiness;

4) complete test sheets specified in Section 20 05 40 and attach them to the Certificate of Readiness;

5) Source Quality Control inspection and test results and attach to the Certificate of Readiness.

1.9.9. Commissioning Closeout Package

a) Submit the following in accordance with Section 20 05 05:

1) Deficiency Report;

2) Commissioning Closeout Report;

3) submit the following for each Product for incorporation into the Operation and Maintenance Manuals in accordance with Section 20 05 05:

i) Identification: manufacturer's name, type, year, serial number, number of units, capacity, and identification to related systems;

ii) functional description detailing operation and control of components;

iii) performance criteria and maintenance data;

iv) safety precautions;

v) operating instructions and precautions;

vi) component parts availability, including names and addresses of spare part suppliers;

vii) maintenance and troubleshooting guidelines/protocol;

viii) product storage, preparation, handling, and installation requirements;

ix) Commissioning Report.

1.10. QUALITY ASSURANCE

1.10.1. Products are to comply with codes, regulations and standards listed above and applicable local codes and regulations.

1.10.2. Fans are to be rated (capacity and sound performance) and certified in accordance with requirements of listed standards.

1.10.3. Site personnel are to be licensed in jurisdiction of the work and under continuous supervision of a foreman who is an experienced system installer.

1.10.4. Manufacturers Qualifications

a) Manufacturer shall be ISO 9000, 9001 or 9002 certified. Manufacturer of product shall have produced similar product for a minimum period of five years. When requested by Consultant, an acceptable list of installations with similar product shall be provided demonstrating compliance with this requirement.

b) Ventilator manufacturers are to be current members of Air Movement and Control Association International Inc. (AMCA).

c) Where manufacturers provide after installation onsite inspection of product installations, include for manufacturer's authorized representative to perform onsite inspection and certificate of approvals.

1.10.5. Installers Qualifications

a) Installers for work to be performed by or work under licensed Mechanical Contractor.

b) Installers of equipment, systems and associated work are to be fully qualified and experienced installers of respective products and work in which they are installing.

c) Where manufacturers provide training sessions to installers and certificates upon successful completion, installers to have obtained such certificates and submit copies with shop drawings.

1.10.6. Regulatory Requirements

a) Products and work to comply with applicable local governing authority regulations, bylaws and directives.

b) Include for required inspections and certificate of approvals of installation work from local governing authorities.

2. PRODUCTS

2.1. ENERGY RECOVERY VENTILATORS

2.1.1. Factory assembled, internally wired energy recovery ventilators in accordance with drawing schedule, and with AHRI certified energy recovery ratings. Energy recovery ventilators are ENERGY STAR qualified.

2.1.2. Interior Unit Casings and Frame: Internal frame type casing constructed of heavy-gauge G90 galvanized sheet steel with interior surfaces lined with 25 mm (1") thick, 24 kg/m³ (1-½ lb./ft.³) density coated glass fibre duct lining material meeting 25/50 flame spread/smoke developed ratings when tested in accordance with CAN/ULC S102, Surface Burning Characteristics of Building Materials and Assemblies, and installed with all exposed edges tucked under flanges. Additional features and requirements as follows:

a) casings complete with factory sealed metal-to-metal joints, a solid integral base with up-turned lips around bottom openings, separate openings and knock-outs for power and control wiring conduit connections, top panels, where joints are required, are to be equipped with a standing seam, and all metal exposed to weather is to be factory cleaned, primed, and finished with baked enamel;

b) removable gasketed panels or hinged gasketed access doors provided for access to all interior components;

c) stainless steel drain pan pitched for positive drainage and equipped with captive condensate drain pipe connection.

2.1.3. Exterior Unit Casings and Frame: Internal frame type double wall weather-proof casing constructed of heavy-gauge G90 galvanized sheet steel, minimum #18 gauge for exterior panels, minimum #24 gauge with interior panels, with 25 mm (1") thick, 24 kg/m³ (1-½ lb./ft.³) density coated glass fibre insulation material meeting 25/50 flame spread/smoke developed ratings when tested in accordance with CAN/ULC S102, Surface Burning Characteristics of Building Materials and Assemblies and secured in place between panels such that it will not sag. Additional features and requirements as follows:

a) weather-tight casings, complete with factory sealed metal-to-metal joints, a solid integral base with up-turned lips around bottom openings, and separate openings and knock-outs for power and control wiring conduit connections;

b) removable gasketed panels or hinged gasketed access doors provided for access to all interior components;

c) stainless steel drain pan pitched for positive drainage and equipped with captive condensate drain pipe connection;

d) downturned design air intake and exhaust hoods constructed and factory finished as for casings, each with an "A" water penetration classification rating up to 200 mm/hr (8"/hr) rainfall at 22 m/s (50 mph) when tested in accordance with AMCA Standard L-500, and washable aluminum mesh pre-filters;

e) minimum 200 mm (8") high, full perimeter, galvanized steel insulated roof curb supplied loose with each unit for field assembly, consisting of die-formed sections with gasket material for installation between curb and unit base.

2.1.4. Enthalpy type energy recovery wheels for both sensible and latent energy recovery, designed to ensure laminar air flow, and designed to transfer moisture entirely in vapour phase, consisting of removable segments for larger wheels. Energy transfer ratings to be of highest rate commercially available. Enthalpy type energy recovery wheels to be in accordance with ASHRAE 84 and AHRI certified to AHRI 1060, and include with wheels, following:

a) silica gel desiccant permanently bonded to lightweight polymer media mounted in a stainless steel rotor;

b) bearings selected for a minimum L-10 life in excess of 400,000 hours;

c) high-strength urethane drive belt factory installed in a pre-stretched state, and a motor conforming to requirements specified in Section 20 05 10;

d) frost control protection with an electric pre-heater.

2.1.5. Disposable glass fibre media filters, ULC listed Class 2, side removable, 50 mm (2") thick, pleated, MERV 11 rating, factory or field installed in a die-formed galvanized steel filter rack at air intake opening.

2.1.6. Centrifugal, draw-through within reference to the energy recovery wheel, double width and inlet exhaust and supply fans with forward curved blades, belt driven or direct driven as indicated, statically and dynamically balanced, mounted to unit base with neoprene vibration isolation, and equipped with:

a) ground and polished steel fan shafts mounted in permanently lubricated sealed ball bearing pillow blocks selected for a minimum L-10 life in excess of 200,00 hours at maximum operating speed;

b) motors and where indicated, belt drives conforming to requirements specified in Section 20 05 10.

2.1.7. Each ventilator is to be equipped with a sealed and factory pre-wired control box containing terminal blocks for power and control wiring connections, integral door interlocking disconnect switch, an overload protected contactor for each motor, fuses, and 24 VAC secondary control transformer.

2.1.8. Control system in accordance with drawing control schematic/sequence, and to include if indicated, all required hardware and circuitry for connection into building automation system using protocol as specified with the system.

2.1.9. Factory supplied, mounted, and wired variable frequency drives conforming to requirements of variable frequency drives requirements specified in Electrical Division specification.

2.1.10. Auxiliary coil(s) as required with each unit, to be rated and certified in accordance with AHRI Standard 410, Forced-Circulation Air-Cooling and Air-Heating Coils, drainable, designed and constructed to meet requirements of the ASME Code Category "H" as a registered fitting, and complete with a CRN. Coil data, performance, and specific features not specified below are to be in accordance with drawing detail. Each coil is to be complete with:

a) slide in/slide out galvanized steel mounting framework;

b) 16 mm (5/8") O.D. seamless copper tubes with 1.24 mm (1/16") thick tube walls;

c) aluminum fins mechanically bonded to tubes;

d) welded Schedule 40 ASTM A53 seamless steel pipe headers with same end supply and return connections, and 9.5 mm (3/8") tappings for an air vent and a drain valve;

e) flanged #14 gauge type 304 stainless steel casing designed to drain off standing water;

f) for cooling coils only, an insulated stainless steel drain pan sloped for positive drainage from all points and equipped with a captive drain pipe connection coupling.

2.1.11. Factory secured seismic restraint connection hardware.

2.1.12. Standard of quality assurance manufacturers are:

a) Greenheck Fan Corp.;

b) Venmar CES Inc.;

c) Summeraire Manufacturing;

d) Carrier Corp;

e) or approved equivalent.

3. EXECUTION

3.1. INSTALLATION OF ENERGY RECOVERY VENTILATORS

3.1.1. Provide energy recovery ventilators.

3.1.2. For suspended units, provide galvanized steel mounting brackets with vibration isolators and suspend each unit, level, and plumb, by means of hanger rods. Provide supplementary support steel as required.

3.1.3. Secure each indoor floor mounted ventilator in place, level and plumb, on neoprene-steel-neoprene vibration isolation pads on a concrete housekeeping pad.

3.1.4. Supply an assembled roof curb for each outdoor roof mounted ventilator and hand to roof trade at site on roof. Carefully locate and size roof openings. Provide gasket material supplied with curb on perimeter of curb and secure ventilator in place.

3.1.5. Where required by local governing codes, brace and secure each unit in accordance with requirements for seismic control and restraint.

3.1.6. For ventilators with auxiliary hydronic coils, connect each coil to system valved hydronic piping with flexible connectors in accordance with Section 23 20 00 HVAC Piping and Pumps. Provide trapped condensate drainage piping connection to cooling coil condensate drain pans in accordance with Section 22 13 00 - Drainage and Vent Piping and Specialties.

3.1.7. Coordinate power wiring connection and provision of a disconnect switch for each ventilator in accordance with electrical work Specification where power wiring is specified.

3.1.8. Refer to Section 20 05 10 for equipment/system manufacturer certification requirements.

3.1.9. Refer to Section 20 05 10 for equipment/system start-up requirements.

END OF SECTION