

1 General

1.1 **SUMMARY**

.1 Section Includes

- .1 Labour, Products, equipment and services necessary to complete the Work of this section.
- .2 This section includes units with integral Heating for indoor installation. Integral heat source shall be electric heater. Airflow arrangement shall be Outdoor Air only. Each unit shall be constructed in a horizontal configuration and shall incorporate additional product requirements as listed in Section 2 of this specification.

1.2 **SUBMITTALS**

.1 Shop Drawings

- .1 Submit Shop Drawings in accordance with Section 01 33 00.
- .2 Complete fan performance curves for Supply Air, with system operating conditions indicated, as tested on an AMCA Certified Chamber.
- .3 Sound performance data for Supply Air, as tested on an AMCA Certified chamber.
- .4 Motor ratings, electrical characteristics and motor and fan accessories.
- .5 Performance ratings for all coils.
- .6 Dimensioned drawings for each type of installation, showing isometric and plan views, to include location of attached ductwork and service clearance requirements.
- .7 Estimated gross weight of each installed unit.
- .8 Installation, Operating and Maintenance manual (IOM) for each model.
- .9 Network interface Controller specifications to include available options and operating protocols. Include complete data on all factory-supplied input devices. It shall be verified with Client BAS's compatibility for its controls.
- .10 Remote Panel description to include all functions.
- .11 Coils shall be Recognized Components per UL 1995, CAN / CSA C22.2 No 236.05. Coil performance shall be calculated in accordance with AHRI 410

1.3 **QUALITY ASSURANCE**

- .1 Source Limitations: Obtain unit with Integral Heating with all appurtenant components or accessories from a single manufacturer.
- .2 Product Options: Drawings must indicate size, profiles and dimensional requirements of unit and are to be based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

.3 **Certifications**

- .1 Entire unit shall be ETL Certified per UL1995 and bear an ETL mark.
- .2 Coils shall be Recognized Components per UL 1995, CAN / CSA C22.2 No 236.05. Coil performance shall be calculated in accordance with AHRI 410.

1.4 **COORDINATION**

- .1 Coordinate size and location of all building penetrations required for installation of each MAU and associated ducting, plumbing and electrical systems.
- .2 Coordinate sequencing of construction of associated plumbing, HVAC and electrical supply.

2 **Products**

.1 **General**

- .1 Unit with Integral Heating shall be fully assembled at the factory and consist of an insulated metal cabinet, outdoor air intake with aluminum mesh filter with bird screen with combination mesh filter and louver, condensate drain pan, P trap, electric coils, motorized intake damper, sensors, service receptacle, freeze protection, filter assembly for intake air, supply air blower assembly and an electrical control center. All specified components and internal accessories factory installed and tested and prepared for single-point high voltage connection.

.2 **Construction**

.1 **Casing:**

- .1 Materials: Formed, single wall metal cabinet with full fiberglass duct liner insulation, fabricated to permit access to internal components for maintenance. Underside of unit shall have formed metal panels covering base panel insulation.
- .2 Outside casing: 18 gauge, galvanized steel meeting ASTM A653 for components that do not receive a painted finish. Pre-painted components as supplied by the factory shall have polyester urethane paint on 18 gauge galvaneal steel. Base rail is 12 gauge, galvanized steel.
- .3 Internal assemblies: 24 gauge, galvanized steel except for motor supports which shall be minimum 14 gauge galvanized steel.
- .4 Cabinet Insulation: Comply with NFPA 90A and NFPA 90B and erosion requirements of UL 181.
- .5 Materials: Fiberglass insulation. If insulation other than fiberglass is used, it must also meet the Fire Hazard Classification shown below.
 - .1 Thickness: 1 inch (25 mm)
 - .2 Fire Hazard Classification: Maximum flame spread of 25 and smoke developed of 50, when tested in accordance with ASTM C 411.

- .3 Location and application: Floor of each unit shall be insulated with fiberglass insulation.
 - .4 Access panels: Unit shall be equipped with insulated removable or hinged/lift off access panels to provide easy access to all major components. Access panels shall be fabricated of 18 gauge galvanized steel. Removable access panels shall incorporate a formed drip edge.
- .2 Fans (Blower):
- .1 Blower section construction, Supply Air: Belt drive motor and blower shall be assembled onto a minimum 14 gauge galvanized steel platform and must have neoprene vibration isolation devices, minimum of 28.6 mm thick helical coil spring vibration devices.
 - .2 Blower assemblies: Shall be statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower.
 - .3 Centrifugal blower housing: Formed and reinforced steel panels to make curved scroll housing with shaped cutoff.
 - .4 Forward curved blower (fan) wheels: Galvanized or aluminum construction with inlet flange and shallow blades curved forward in direction of airflow. Mechanically attached to shaft with set screws.
 - .5 Blower section motor source quality control: Blower performance shall be factory tested for flow rate, pressure, power, air density, rotation speed and efficiency. Ratings are to be established in accordance with AMCA 210, "Laboratory Methods of Testing Fans for Rating." Forward curve blower:
- .3 Control Center:
- .1 Control center / connections: unit shall have an electrical control center where all high and low voltage connections are made. Control center shall be constructed to permit single-point high voltage power supply connections.
- .4 Heating Coil:
- .1 Electric heat: Electric heater is to be UL listed with open coil elements. Heater control cabinet is to be installed within the units heating section. Electric heater is to be provided with SCR controls. Electric heater is to be controlled off of discharge temperature external 2-20. Units with electric heat are to be provided with a center that shall be constructed to permit single-point high voltage power supply connections.
- .5 Motorized Inlet Air Damper: It shall be low leakage type and shall be factory installed.
- .6 Unit sensors and device controllers are to be factory supplied and tested by the unit manufacturer.

.7 Motors:

- .1 General: Blower motors greater than 0.75 horsepower shall be “NEMA Premium™” unless otherwise indicated. Compliance with EPA’s minimum energy-efficiency standards for single speed ODP and TE enclosures is not acceptable.
- .2 Motors shall be heavy-duty, permanently lubricated type to match the fan load and furnished at the specified voltage, phase and enclosure.
- .3 Drives shall be sized for a minimum of 150% of driven horsepower and pulleys shall be fully machined cast-type, keyed and fully secured to the fan wheel and motor shafts.
- .4 Electric motors of ten horsepower or less shall be supplied with an adjustable drive pulley. Comply with requirements in Division 23 05 13, matched with fan load.

.8 Unit Controls:

- .1 The unit shall be constructed so that it can function as a stand-alone heating system controlled by factory-supplied remote panel, thermostats and sensors or it can be operated as a heating system controlled by a remote panel complete with control switches. If Building Automation System (BAS) is available, this unit shall be provided and controlled by a factory-installed Network interface controller that is connected to various sensors (See Section 9).
- .2 Unit shall incorporate a Network interface controller with integral LCD screen that provides text readouts of status, operating settings and alarm conditions. Network interface controller shall have a built-in keypad to permit operator to access read-out screens and change settings without the use of ancillary equipment, devices or software. DDC controllers that require the use of equipment or software that is not factory-installed in the unit are not acceptable. Alarm readouts consisting of flashing light codes are not acceptable.
- .3 Sensors to be provided:
 - .1 Room / Space Temperature Sensors only applicable if room temp is selected
 - .2 Heating Inlet Air Sensor
 - .3 Dirty Filter Sensor
 - .4 Fire Stat Type III
 - .5 120V/24V Smoke Detector

.9 Control and Monitoring System (~~Future~~ BAS Integration)

- .1 Any vendors that are authorized dealers or distributors of the following control systems are acceptable:
 - .1 Delta Controls
 - .2 Reliable Controls

- .3 Schneider Electric SmartX Series
- .4 Distech Controls
- .5 Johnson Controls Facility Explorer
- .6 Honeywell CIPer series, Spyder Models 5 or 7
- .2 BAS System Integration:
 - .1 All control systems must be integrated to the City's J2 Innovations Fluid Integration (FIN) serve, including but not limited to the following:
 - .1 Graphical user interface (monitoring and control)
 - .2 Alarming
 - .3 Data Trending
 - .4 Data Archiving
 - .5 Project Haystack naming convention
 - .2 The installer must be licensed by J2 Innovations to sell, install, program and configure Fluid INtegration (FIN).
 - .3 Building Controllers (BC) must be Tridium Niagara JACE with the Haystack module and driver. The installer must be a licensed Tridium system integrator for any Tridium BCs or embedded or edge Niagara Framework products used. Soft JACE is not accepted.
- .3 Licensing Requirements
 - .1 Licenses shall be provided to and in the name of the City of Toronto
 - .2 Licenses shall be perpetual, transferrable, assignable and royalty free.
 - .3 Tridium Licenses shall allow all workbench/supervisor brands complete system access and functionality.
- .4 Installer and Manufacturer Qualifications
 - .1 Installer shall have an established working relationship with Control System Manufacturer.
 - .2 Installer shall have successfully completed control system's control system training. Upon request, installer shall present record of completed training including course outlines.

.3 It is the intent of these specifications to define an open protocol state-of-the-art distributed computerized Building Management and Control System, which is user friendly, has known reliability, is extremely responsive, and which is to be designed, installed, implemented, and supported by a local office of approved bidders.

.4 BAS Contractor provides three locations for successful installations of similar open protocol computer-based systems. Sites provided must consist of more than 150 hardware inputs/outputs. Project sites must be local to the location of this project.

.10 Filters:

.1 Unit shall have 50mm thick MERV 13 disposable pleated filters following the outdoor air intake in a V-bank arrangement and shall be accessible from the exterior of the unit.

.11 Acceptable Manufacturers

- .1 Greenheck
- .2 Johnson Controls
- .3 Carrier
- .4 Trane
- .5 McQuay/Daikin
- .6 Lennox

3 Execution

3.1 **EXAMINATION**

- .1 Prior to start of installation, examine area and conditions to verify correct location for compliance with installation tolerances and other conditions affecting unit performance. See unit IOM.
- .2 Examine roughing-in of plumbing, electrical and HVAC services to verify actual location and compliance with unit requirements. See unit IOM.
- .3 Proceed with installation only after all unsatisfactory conditions have been corrected.

3.2 **INSTALLATION**

- .1 Installation shall be accomplished in accordance with these written specifications, project drawings, manufacturer's installation instructions as documented in manufacturer's IOM, Best Practices and all applicable building codes.

3.3 **CONNECTIONS**

- .1 In all cases, industry Best Practices shall be incorporated. Connections are to be made subject to the installation requirements shown above.

- .2 Piping installation requirements are specified in Division 22 (Plumbing). Drawings indicate general arrangement of piping, fittings and specialties.
- .3 Duct installation and connection requirements are specified in Division 23 of this document.
- .4 Electrical installation requirements are specified in Division 26 of this document.

3.4 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Service: Engage a factory authorized service representative to inspect field assembled components and equipment installation, to include electrical and piping connections. Report results to be submitted to the engineer in writing. Inspection must include a complete startup checklist to include (as a minimum) the following: Completed Start-Up Checklists as found in manufacturer's IOM.

3.5 START-UP SERVICE

- .1 Engage a factory authorized service representative to perform startup service. Clean entire unit, comb coil fins as necessary, and install clean filters. Verify water source for compliance with manufacturer's requirements for flow and temperature. Measure and record electrical values for voltage and amperage. Refer to Division 23 "Testing, Adjusting and Balancing" and comply with provisions therein.

3.6 DEMONSTRATION AND TRAINING

- .1 Engage a factory authorized service representative to train owner's maintenance personnel to adjust, operate and maintain the entire unit. Refer to Division 01 Section Closeout Procedures and Demonstration and Training.

End Of Section

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