1. GENERAL

1.1 Summary

.1 Section Includes:

.1 Materials and installation for self-contained single zone, hot water, packaged make-up air unit.

1.2 References

.1 American National Standards Institute (ANSI)/Air Conditioning, Heating and Refrigeration Institute (AHRI):

.1 AHRI 270, Sound Rating of Outdoor Unitary Equipment.

.2 ANSI/UL 1995 B, Standard for Heating and Cooling Equipment.

.3 Canadian Standards Association (CSA):

.1 CSA C22.1, Canadian Electrical Code Handbook.

.4 Health Canada / Workplace Hazardous Materials Information System (WHMIS):

.1 Safety Data Sheets (SDS).

.5 National Fire Protection Association:

.1 NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems.

1.3 Action and Informational Submittals

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications, and datasheet for packaged make-up air unit.

.3 Shop Drawings:

.1 Submit Shop Drawings to indicate project layout and dimensions; indicate:

.1 Equipment, control assemblies, thermostatic controls, auxiliaries and hardware, and recommended ancillaries.

.2 Dimensions, internal and external construction details, recommended method of installation, mounting curb details.

.3 Detailed composite wiring diagrams for control systems showing factory installed wiring and equipment on packaged equipment or required for controlling devices of ancillaries, accessories, and controllers.

.4 Fan performance curves.

.5 Details of vibration isolation.

.4 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals include data as follows:

.1 Provide for units, manufacturer's name, type, year, number of units, and capacity.

2. PRODUCTS

2.1 Make-Up Air Unit – Hydronic Heating

.1 Acceptable Manufacturers:

.1 Engineered Air

.2 Air Wise

.3 Solution Air

.4 Daikin

.5 Or approved equivalent

.2 General:

.1 Make-up air unit with integral heating.

.2 Fully assembled at the factory.

.3 Insulated metal cabinet, outdoor air intake, glycol coil, motorized intake damper, sensors, curb assembly, filter assembly for intake air with summer and winter filter positions, supply air blower assembly, and an electrical control center.

.4 All specified components and internal accessories factory installed and tested and prepared for single-point electrical connection.

.5 Unit and all components CSA/ULc approved and bears the label.

.6 Capacity: as scheduled.

.3 Cabinet:

.1 Formed, double wall insulated metal cabinet.

.2 Fabricated to permit access to internal components for maintenance.

.3 Underside of unit to have formed metal panels covering base panel insulation.

.4 Outside casing: 1.3 mm G60 galvanneal steel painted with polyester urethane paint.

.5 Base rail is 1.6 mm, galvanized (G90) steel.

.6 Internal assemblies: 0.7 mm, galvanized (G90) steel except for motor supports which are 2.0 mm, galvanized (G90) steel.

.7 Cabinet Insulation:

.1 Comply with NFPA 90A and NFPA 90B and erosion requirements of UL 181.

.2 All units shall be internally insulated with 50 mm (2") thick, 24 kg/m^3 (1½ lb/ft^3) density insulation.

.3 Fire Hazard Classification: Maximum flame spread of 25 and smoke developed of 50, when tested in accordance with ASTM C 411.

.4 Cover full interior coverage of entire cabinet including walls, roof, and floor.

.4 Access panels:

.1 Equip unit with insulated, hinged access panels to provide easy access to all major components.

.2 Fabricated of 1.3 mm galvanized G90 steel.

.5 Supply Air Blower Assembly:

.1 Belt driven, double width, and double inlet, forward curve blower.

.2 Motor: TEFC, 1,800 rpm.

.3 Assembly mounted on heavy gauge galvanized rails and further mounted on 30 mm thick neoprene vibration isolators.

.4 Blower assemblies:

.1 Statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower.

.2 Centrifugal blower housing:

.1 Formed and reinforced steel panels to make curved scroll housing with shaped cut-off.

.3 Forward curved blower (fan) wheels:

.1 Galvanized or aluminum construction with inlet flange and shallow blades curved forward in direction of airflow.

.2 Mechanically attached to shaft with set screws.

.4 Blower performance factory tested for flow rate, pressure, power, air density, rotation speed and efficiency.

.5 Ratings are to be established in accordance with AMCA 210, "Laboratory Methods of Testing Fans for Rating."

.5 Motors:

.1 Heavy-duty, permanently lubricated type to match the fan load and furnished at the scheduled voltage, phase, and enclosure.

.2 Drives 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.

.3 Motors supplied with an adjustable drive pulley.

.6 Control Center:

.1 Provide electrical control center where all high and low voltage connections are made.

.2 Constructed to permit single-point power supply connection.

.7 Hydronic Heating Coil:

.1 General:

.1 Access to coils from both sides of unit for service and cleaning.

.2 Enclose coil headers and return bends fully within unit casing.

.3 Coil connections to extend a minimum of 125 mm beyond unit casing for ease of installation.

.4 Drain and vent connections provided exterior to unit casing.

.5 Coil connections factory sealed with grommets on interior and exterior and gasket sleeve between outer wall and liner where each pipe extends through the unit casing to minimize air leakage and condensation inside panel assembly.

.6 Coils removable through side and top panels of unit without the need to remove and disassemble the entire section from the unit.

.2 Certification:

.1 In accordance with AHRI Standard 410 and bear the AHRI label. Coils exceeding the scope of the manufacturer’s certification and/or the range of AHRI’s standard rating conditions will be considered provided the manufacturer is a current member of the AHRI Air-Cooling and Air-Heating Coils certification programs and that the coils have been rated in accordance with AHRI Standard 410. Manufacturer must be ISO 9002 certified.

.3 Headers:

.1 Seamless copper tubing.

.2 Intruded tube holes to provide maximum brazing surface for tube to header joint, strength, and inherent flexibility.

.3 Diameter varies with fluid flow requirements.

.4 Fins:

.1 0.2 mm aluminum plate.

.2 Full drawn collars to provide a continuous surface cover over the entire tube.

.3 Tubes:

.1 Mechanically expanded into the fins to provide a continuous primary to secondary compression bond over the entire finned length.

.2 16 mm OD seamless copper, 0.6 mm nominal tube wall thickness, expanded into fins, brazed at joints.

.3 Soldered U-bends, 0.6 mm.

.4 Coil connections:

.1 RFWN Class 150# flanged carbon steel.

.2 Vent and drain fittings furnished on connections, exterior to air handler.

.3 Vent connections provided at the highest point to assure proper venting.

.4 Drain connections provided at the lowest point to insure complete drainage.

.5 Coil casings shall be a formed channel frame of galvanized steel.

.5 Finishes:

.1 Corrosion Protection: Baked on phenolic coating suitable for three thousand (3000) hours salt spray per ASTM-B117.

.2 No exposed copper.

.3 Acceptable Products:

.1 Heresite P413.

.2 Or approved equivalent.

.6 Capacity and Performance: as scheduled.

.8 Motorized Inlet Air Damper:

.1 Acceptable Manufacturers:

.1 Tamco

.2 Ruskin

.3 Ventex

.2 Low leakage type and factory installed.

.3 Outdoor air damper insulated aluminum low leak airfoil Tamco Series 9000 or approved equivalent.

.4 Dampers parallel blade type.

.5 Damper Operators:

.1 24 V.

.2 Spring return.

.3 Two position.

.4 Position feedback.

.5 Ambient temperature range -40°C to +50°C.

.6 Outside air damper fails to open position.

.9 Controls:

.1 Review Sequence of Operations for HVAC Section 23 09 93.11 and Process & Instrumentation Diagrams for HVAC for all control components to be supplied with these units.

.2 Provide a system of motor control, including all necessary terminal blocks, motor contactors, motor overload protection, grounding lugs, control transformers, auxiliary contactors and terminals for the connection of external control devices or relays.

.3 Fire alarm circuits (where required) shall be powered from a relay in unit circuitry.

.4 Integral hardwired low limit freeze protection set at 4°C with enable / disable and bypass timers for start-up and anti-nuisance.

.5 Inputs from Plant Control System (PCS):

.1 Start/Stop.

.2 Discharge air temperature setpoint.

.3 Winter/Summer mode.

.6 Outputs to PCS:

.1 Fan run status.

.2 Dirty Filter.

.3 General Alarm.

.4 Damper position.

.5 Heating valve position.

.10 Filter:

.1 Filter section with stainless steel filter racks and guides with hinged and latching access doors on both sides for side loading and removal.

.2 Filter media shall be UL 900 listed, Class I or Class II.

.3 Average capture efficiency of 70 percent in the 3-10 micron particle range. Minimum Efficiency Reporting Value (MERV) 8 at 2.5 m/s per ASHRAE 52.2.

.4 Diamond grid with 98 percent open area to provide support for the media.

.5 Bond the media-to-media support to ensure pleat stability enclosure the media with a rigid moisture resistant, heavy duty kraft board.

.6 Bond the filter pack to the inside periphery of the frame to eliminate air bypass.

.7 Material: Non-Woven Reinforced Cotton Rayon. Angle arrangement with 50 mm deep, pleated, disposable panel filters.

.8 When indicated on the equipment schedule the supply airstream will be provided with a combination particulate and molecular media filter with an efficiency of 60% per ISO16890 and a MERV8 particulate filter rating. (Camfil City Pleat 300 or approved equal).

.9 Air Filter Gauges:

.1 Provide each filter bank with "Dwyer 2000 magnehelic" air filter gauge (or approved equal) complete with static pressure tips and aluminum tubing all factory installed. Filter gauge to have a range of 0 to 500 Pa (0 to 2”).

3. EXECUTION

3.1 Manufacturer's Instructions

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 Installation

.1 Install as per manufacturers' instructions on concrete pad.

3.3 Demonstration

.1 Training: in accordance with Section 01 91 31 - Commissioning Plan.

3.4 Cleaning

.1 Perform cleaning operations as specified in Section 01 74 11 - Cleaning and in accordance with manufacturer's recommendations.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools, and equipment.

END OF SECTION