1. GENERAL

1.1 Scope

.1 Packaged, indoor DX cooling unit with 100% outdoor air capability.

.2 Outdoor condensing unit.

.3 Operating controls.

.4 Remote panel.

1.2 References

.1 Meet the requirements of CGA/CSA, Provincial and Municipal Codes and be CSA listed.

.2 Test and rate cooling systems to AHRI Standard 210.

.3 Units shall be products of manufacturers who provide local service personnel from factory representative, franchised dealer, or certified maintenance service shop.

.4 AMCA 99, Standard Handbook.

.5 AMCA 210, Laboratory Methods of Testing Fans for Rating Purposes.

.6 AMAC 300, Test Code for Sound Rating Air Moving Devices.

.7 AMAC 301, Method of Calculating Fan Sound Ratings from Laboratory Test Data.

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

.9 UL 900 – Determining the quantity of smoke generated and the combustibility of air filter units.

1.3 Submittals

.1 Provide submittals in accordance with Section 01 33 00 and the following:

.1 Manufacturer's descriptive literature for materials.

.2 Submit certified fan performance curves with system operating conditions indicated per equipment schedules. Select fans at maximum efficiency for specified duty.

.3 Submit certified sound power levels for make-up air unit inlet and outlet and casing radiation at rated capacity in accordance with AMCA. List for individual octave bands in dB referenced to A rating.

.4 Dampers, including housings, linkages, and operators.

.5 Air Filters: Media, efficiency rating, velocity, pressure drop charts and capacities. Indicate mounting method and arrangement.

.6 Heating and cooling coil performance at specified operating conditions.

.7 Materials of construction and Electrical Classification: Indicate material and gauge of all construction components and area classification.

.8 Mass distribution drawings: show point loads and recommended method of unit installation.

.9 Detailed composite wiring diagrams showing factory installed wiring, including wiring of control components.

1.4 Warranty

.1 Provide five (5) year, limited warranty on compressor units.

2. PRODUCTS

2.1 Air Handling Unit

.1 Acceptable Manufacturers:

.1 Engineered Air

.2 Air Wise

.3 Solution Air

.4 Daikin

.5 Or approved equivalent

.2 General:

.1 Self-contained, packaged, factory assembled and pre-wired Air Handling Unit (AHU) consisting of a cabinet and frame, supply fan, DX cooling coil, hydronic heating coil outdoor air, return air dampers, controls, and air filter with summer and winter positions.

.2 Supply, return and outdoor air connections air connection as indicated on Drawings.

.3 Casing Construction:

.1 1.3 mm (18 gauge), satin coat, galvanized sheet metal.

.2 Surfaces cleaned with degreasing solvent to remove oil and metal oxides and primed with a two-part acid based etching primer. Finish coat electrostatically applied enamel, to all exposed surfaces. All unprotected metal and welds factory coated.

.3 Walls, roofs, and floors of formed construction with at least two breaks at each joint. Joints secured by sheet metal screws or pop rivets. All joints caulked with a waterproof sealant.

.4 Access doors:

.1 Hinged access doors with e-profile gasket, fully lined, minimum of two (2) lever handles, operable from both inside and outside of unit.

.2 Provided to give access to the following components: fans and motors, filters, dampers and operators, access plenums, and electrical control panels.

.3 Access doors sized large enough for easy access. Removal of screwed wall panels is not acceptable.

.4 Sized sufficiently large to permit replacement of filters from outside of unit.

.5 Insulation:

.1 All units shall be internally insulated with 50 mm (2”) thick, 24 kg/m³ (1½ lb/ft³) density insulation.

.2 Insulation secured to metal panels with a fire-retardant adhesive and welded steel pins at 400 mm (16") o/c. All longitudinal insulation joints and butt ends covered by a sheet metal break to prevent erosion of exposed edges. Drain pans and all floor areas insulated on the underside.

.6 Cooling Coil Drain Pan:

.1 Fabricated of stainless steel and integral to the floor paneling.

.2 Minimum 50 mm (2") deep with welded corners.

.3 Drain pans extend a minimum of 150 mm (6") downstream of coil face and are provided with a 40 mm (1½") S.S. M.P.T. drain connection.

.4 Drain pans must have a fast pan and be sloped and pitched such that there is no standing water. Provide intermediate fast pans between cooling coils where required for effective moisture removal.

.7 Support:

.1 Indoor, suspended units provided with 13 mm (½") holes in the base channels to be suitable to accommodate hanger rods to support entire weight of unit from rods at hole locations (rods supplied by others).

.8 Fan:

.1 Centrifugal fans rated in accordance with AMCA Standard Test Code, Bulletin 210.

.2 Manufacturer a member of AMCA.

.3 Fans and fan assemblies dynamically balanced during factory test run.

.4 Fan shafts selected for stable operation at least 20% below the first critical RPM and provided with a rust inhibiting coating.

.5 Single low pressure forward curved fans of 450 mm (18") or less diameter equipped with permanently lubricated cartridge ball bearings supported by a 3 point "spider" bearing bracket in the fan inlets. All other forward curved fan assemblies equipped with greaseable pillow block bearings supported on a rigid structural steel frame.

.6 Provide adjustable drives coated with rust inhibiting coating.

.7 Locate motor, fan bearings, and drive assembly inside fan plenum to minimize bearing wear and to allow for internal vibration isolation of the fan-motor assembly, where required. Motor mounting adjustable to allow for variations in belt tension.

.8 Provide vibration isolators for fan-motor assemblies. Bolt isolators to steel channel welded to unit floor, which is welded to the structural frame of the unit. Isolators to be neoprene-in-shear type for single 230 mm (9") 380 mm (15") diameters forward curve fans. All other fans to incorporate vertical spring type isolators with leveling bolts, bridge bearing waffled pads with minimum 25 mm (1") static deflection designed to achieve high isolation efficiency. Attach fans to discharge panel by a polyvinyl chloride coated polyester woven fabric with a sealed double locking fabric to metal connection.

.9 Provide single extended grease line from far side to access side bearing.

.10 ODP (open drip proof) fan motors; super-E high efficiency.

.9 Filters:

.1 Provide filter sections with adequately sized access doors to allow easy removal of filters from one side as noted on the Drawings.

.2 Side removal 50 mm (2") filters slide into a formed metal track, sealing against metal spacers at each end of the track.

.3 50 mm (2") Pleated Panel Disposable Filters:

.1 Natural and synthetic fiber media.

.2 Rust resistant support grid and high-wet strength beverage board enclosing frame with diagonal support members bonded to the air entering and air exiting side of each pleat.

.3 Permanent re-usable metal enclosing frame.

.4 Filter media minimum efficiency of 30-35% on ASHRAE Standard 52.1, and a minimum of MERV 8 per ASHRAE 52.2. Rated U.L. Class 2.

.5 For Electrical Room, Control Room or when indicated on the equipment schedule the supply airstream will be provided with a 100mm combination particulate and molecular media filter with an efficiency of 60% per ISO16890 and a MERV8 particulate filter rating. (Camfil City Pleat 400 or approved equal).

.6 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”).

.10 Evaporator Coil:

.1 Construction: Copper tube aluminum fin coil assembly.

.2 Drain pan: Sloped stainless steel.

.3 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.

.4 Capacity and Performance: as scheduled.

.11 Hydronic Heating Coil:

.1 General:

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

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

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

.4 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.

.5 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.

.12 Dampers:

.1 Acceptable Manufacturers:

.1 Tamco

.2 Ruskin

.3 Ventex

.2 Return air damper extruded aluminum low leak airfoil Tamco Series 1000 or approved equivalent.

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

.4 Dampers parallel blade type.

.4 Outside Air / Return Air Mixing Section:

.1 Performance: Capable of providing 100% outside air with return air relief for free cooling.

.2 Damper Operators:

.1 24 V.

.2 Spring return.

.3 Modulating 0 – 10 VDC / 4 – 20 mA input control.

.4 2 – 10 VDC / 4 – 20 mA position feedback.

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

.6 Outside air damper fails to closed position.

.7 Return air damper fails to open position.

.5 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 Unit Control Panel:

.1 Unit will be provided complete with a unitary DDC controller that is fully integrated into the Plant Control System (PCS).

.2 Automatic controls shall be housed in a control panel mounted in or on the air handling unit, which will meet that standard of the specific installation.

.3 Panel to include indication and troubleshooting LED lights, multi-meter set point and sensor temperature test points, and a common alarm contact in the event of equipment failure. Information can be accessed from a handheld device or laptop computer for improved access to control settings.

.4 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.

.5 Unit controls will be complete with an ambient air temperature sensor to determine heating or cooling mode.

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

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

.8 Inputs from Plant Control System (PCS):

.1 Start/Stop.

.2 Discharge air temperature setpoint.

.3 Winter/Summer mode.

.9 Outputs to PCS:

.1 Fan run status.

.2 Dirty Filter.

.3 General Alarm.

.4 Damper position.

.5 Heating valve position.

.6 Mechanical cooling status.

2.2 Condensing Unit

.1 cETL, ETLUS approved.

.2 Designed for a minimum of 8°C (15°F) liquid subcooling.

.3 Operate down to 10°C (50°F) as standard.

.4 Multiple compressor/condenser circuits separate from each other.

.5 Suction and liquid lines extended to the outside of the cabinet.

.6 Service ports fitted with Schraeder fittings connected to the suction and discharge lines for charging or pressure gauge readings. Semi-hermetic units also incorporate liquid line service ports and liquid line manual shutoff valves.

.7 Controls for hermetic compressor units include compressor and condenser fan motor contactors, control circuit transformer, cooling relays, non-recycling pumpdown relays, ambient compressor lockout, manual reset high pressure controls and automatic reset low pressure controls. Head pressure actuated fan cycling control provided on all multiple condenser fan units.

.8 Provide five (5) minute anti-cycle timers.

.9 Provide hot gas bypass connection on the lead compressor.

.10 Refrigeration specialties such as solenoid valves, TX valves, etc., to be supplied and installed by refrigeration contractor.

.11 Unit to have a minimum of two (2) compressors.

.12 Coil and Tubing 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.

3. EXECUTION

3.1 Installation

.1 Suspend indoor units from ceiling or mount on concrete pads as indicated.

.2 Install outdoor condensing unit on a corrosion resistant galvanized steel or aluminum frame suitable to the dimensions and weight of the unit, with rubber support bases.

.3 Provide flexible duct connections for supply and return ducting.

3.2 Performance

.1 Refer to Equipment Schedules.

END OF SECTION