Part 1 General

1.1 REFERENCE STANDARDS

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

.1 ANSI/AHRI 210/240, Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment.

.2 CSA Group

.1 CSA B52-05, Mechanical Refrigeration Code.

.2 CSA C22.1-15, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.

.3 CSA B149.1-15 Natural Gas and Propane Installation Code.

.3 National Fire Protection Association (NFPA)

.1 NFPA 90A-[12], Standard for the Installation of Air Conditioning and Ventilating Systems.

.4 Environment Canada Federal Halocarbon Regulation 2003.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for outdoor HVAC equipment and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

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

.1 Equipment, piping, and connections, together with valves, strainers, control assemblies, thermostatic controls, auxiliaries and hardware, and recommended ancillaries which are mounted, wired and piped ready for final connection to building system, its size and recommended bypass connections.

.2 Piping, valves, fitting shipped loose showing final location in assembly.

.3 Control equipment shipped loose, showing final location in assembly.

.4 Dimensions, internal and external construction details, recommended method of installation with proposed structural steel support, mounting curb details, sizes and location of mounting bolt holes; include mass distribution drawings showing point loads.

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

.6 Pump and fan performance curves.

.7 Details of vibration isolation.

.8 Type of refrigerant used.

.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

.6 Manufacturer's Field Reports:

.1 Submit manufacturer's field reports specified.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00- Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for outdoor HVAC equipment for incorporation into manual.

.1 Indicate: brief description of unit, indexed, with details of function, operation, control, and service for components.

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

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 33 00 – Submittal Procedures.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect outdoor HVAC equipment from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.5 WARRANTY

.1 For Work of this Section 23 74 00- Packaged Outdoor HVAC Equipment, 12 months warranty period is extended to 60 months.

.2 Contractor hereby warrants that packaged rooftop HAVC units and refrigeration compressors will function and operate in accordance with CCDC 2 GC 24, but for 60 months.

Part 2 Products

2.1 GENERAL

.1 Roof mounted, self-contained single zone or multi-zone units with gas burner and DX refrigeration and bear label of CSA.

.2 Units to consist of cabinet and frame, supply fan, return fan (where indicated), burner with integral induced draft fan, air filter, refrigerant cooling coil, compressor, condenser coil and fans, motorized outside air damper, return damper.

.3 Units shall come ready to fit on existing roof curbs. Transition curbs less than 650mm in height are acceptable.

.4 Conform to ANSI/AHRI 210/240, rating for unit larger than 40 kW nominal.

2.2 CABINET

.1 Framing and supports: 2 mm thick welded steel, galvanized after manufacture, with lifting lugs.

.2 Outer casing: weathertight 1.2mm thick galvanized steel with baked enamel finish.

.3 Access: gasketted hinged doors with locking door handle type fasteners.

.4 Insulation: neoprene coated glass fibre on surfaces, 50mm thick, 32kg/m3density.

2.3 FANS

.1 Centrifugal, forward curved impellers, statically and dynamically balanced. V-belt drive with adjustable variable pitch motor pulley, fan and motor integrally mounted on isolation base, separated from unit casing with flexible connections and spring isolators. Vibration isolators: 95% efficiency.

2.4 AIR FILTERS

.1 As indicated.

2.5 HEAT EXCHANGERS AND BURNERS

.1 Gas fired, multiple flue passes, with primary heating surface of stainless steel, secondary heating surface, stainless steel tubes.

.1 Gas burner: factory mounted, wired and fire tested complete with operating and safety controls.

.2 Spark ignited pilot with pilot flame safety shut-off.

2.6 HOT WATER COIL

.1 Copper fins, mechanically bonded to copper tubes.

.2 Piping: complete with shut off valves, drain valves, unions or flanges.

.3 Hydrostatically tested to 1.7MPa.

2.7 REFRIGERATION

.1 Conform to CSA B52 and UL 1995 requirements, along with Environment Canada Federal Halocarbon Regulation (2003)

.2 Compressor/Condenser Section:

.1 Hermetic compressors, vibration isolated with flexible suction and discharge connections, oil sight glass, oil pressure switch, crankcase heater with control to liquid line solenoid valve.

.2 Fans: propeller type with single piece spun venturi outlets and zinc plated guards. Motors: sequenced for head pressure control.

.3 Electrical system: complete with operating controls, oil and refrigerant pressure protection, motor overload protection, weatherproof electrical wiring with weatherproof disconnect.

.4 Condenser: staggered copper tube aluminum fin coil assembly with sub-cooling rows.

.5 Refrigerant: R-410A.

.3 Evaporator:

.1 Rated to ANSI/AHRI 210/240.

.2 Coil: size as indicated, staggered seamless copper tubes expanded into aluminum fins.

.3 Cooling coil condensate drain pans: designed to avoid standing water, easily cleaned or removable for cleaning. Drain connection: deep seal trap complete with trap seal primer.

2.8 CONTROLS

.1 In addition to combustion safety controls, low limit on supply and freeze protection on water coils.

.2 Single Zone Cooling Control:

.1 Zone sensor to activate cooling relay in control circuit cycling compressor. Provide safeties and pressure controls. Condenser fans to operate in sequence.

.2 As back pressure is reduced, hot gas bypass opens to maintain set back pressure.

.3 Multi-Zone Heat-Cool Unit:

.1 Modulating zone thermostats controlling modulating zone damper operators shall maintain zone temperatures.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for outdoor HVAC equipment installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Install as per manufacturers' instructions on existing roof curbs as indicated.

.2 Manufacturer to certify installation, supervise start-up and commission unit.

3.3 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Have manufacturer of products supplied under this Section review work involved in handling, installation/application, protection, and cleaning of its products, and submit written reports, in acceptable format, to verify compliance of work with Contract.

.2 Provide manufacturer's field services, consisting of product use recommendations and periodic site visits for inspection of product installation, in accordance with manufacturer's instructions.

.3 Schedule site visits to review work at stages listed:

.1 Upon completion of work, after cleaning is carried out.

.2 Obtain reports within 3 days of review and submit immediately to Departmental Representative.

.3 Performance Verification:

.1 Rooftop Air Handling Units:

.1 Set zone mixing dampers for full cooling, except that where diversity factor forms part of design set that percentage of zone dampers to full heating.

.2 Set outside air and return air dampers for minimum outside air.

.3 Check for smooth, vibration less correct rotation of supply fan impeller.

.4 Measure supply fan capacity.

.5 Adjust impeller speed as necessary and repeat measurement of fan capacity.

.6 Set outside air and return air dampers for the percentage of outside air required by design and repeat measurements of fan capacity.

.7 OAD: verify for proper stroking, interlock with RAD.

.8 Measure flow rates (minimum and maximum) of SA, RA, EA, relief air.

.9 Simulate maximum cooling load and measure refrigerant hot gas and suction temperatures and pressures.

.10 Use smoke test to verify no short-circuiting of EA, relief air to outside air intake or to condenser intake.

.11 Simulate maximum heating load and:

.1 Verify temperature rise across heat exchanger.

.2 Perform flue gas analysis. Adjust for peak efficiency.

.3 Verify combustion air flow to heat exchanger.

.4 Simulate minimum heating load and repeat measurements.

.12 Verify operating control strategies, including:

.1 Freeze protection.

.2 Economizer cycle operation, temperature of change-over.

.3 Alarms.

.4 Operation of remote panel including pilot lights, failure modes.

.13 Set zone mixing dampers for full heating and repeat measurements.

.14 Measure return fan capacity.

.15 Adjust impeller speed as necessary and repeat measurement of return fan capacity.

.16 Check capacity of heating unit.

.17 Refer to other sections of these specifications for PV procedures for other components.

.2 Verify accessibility, serviceability of components including motorized dampers, filters coils, fans, motors, operators, humidifiers, sensors, electrical disconnects.

.3 Verify accessibility, clean ability, drainage of drain pans for coils, humidifiers.

.4 Commissioning Reports:

.1 In accordance with Section 01 91 13- General Commissioning (Cx) Requirements: reports supplemented as specified herein. Include:

.1 Report forms as specified Section 01 91 13- General Commissioning (Cx) Requirements: Report Forms and Schematics.

3.4 DEMONSTRATION

.1 Training: in accordance with Section 01 91 13- General Commissioning (Cx) Requirements: Training of O&M Personnel, supplemented as specified.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

.3 Perform cleaning operations in accordance with manufacturer's recommendations.

END OF SECTION 23 74 00