1. GENERAL

1.1 Scope

.1 Outdoor mounted custom pre-manufactured air handler.

.2 Each air handling unit to be supplied with a separate stand alone control system, located in a local panel.

.3 Provide a remote control panel for mounting in Control Room.

.4 Provide AHU control systems to comply with all relevant Division 15 Control Sections and Drawings.

1.2 Quality Assurance

.1 It is the intent of this Specification that the manufacturer provides air handling units designed and manufactured specifically to the requirements of this project. Overall dimensions and configuration are to be as shown on the plans and as described in the specifications. Take responsibility for the engineering and operational integrity of the air handling units.

.2 Unit construction shall be per the construction details included at the end of this section, and as described herein.

.3 Provide unit produced by a recognised manufacturer who maintains a local service agency and parts stock.

.4 Air flow rates, external static pressures, water flow rates, coil face velocities, filter face velocities, water and air side pressure drops shall be the same or better than specified for alternate selections.

.5 Fans shall be AMCA certified.

.6 Coils shall be ARI certified.

.7 Provide all motors with thermal overload protection. All motors shall be high efficiency type, suitable for inverter duty (variable frequency drives).

.8 Start-up of unit shall be executed by manufacturer's personnel. A complete manufacturer's check list of field start-up tests must be submitted with operations and maintenance instructions and shall be signed by start-up technician and mechanical trade, field supervisor as certified satisfactory for operation.

.9 All components, paints and lining shall have a flame spread rating of not over 25 without evidence of continued progressive combustion and a smoke developed rating no higher than 50.

.10 Manufacturer to provide a list of projects completed locally with similar model type units.

1.3 Submittals

.1 Submit shop drawing, which shall include the following minimum information. Shop drawings submitted without this information shall be automatically rejected.

.1 Construction details: Submit unit construction drawings for the following components:

.1 Side panels, including connection details.

.2 Top panel, including connection details.

.3 Floor, including connection details.

.4 Doors, hinges, latch, viewing port.

.5 Fan, motor and drive, mounting and isolation.

.6 Coil section.

.7 Pipe and conduit penetration through casing or floor.

.8 Drain pan.

.9 Damper, linkage and drive construction and mounting.

.2 Materials of Construction: Indicate material and gauge of all construction components.

.3 Mass Distribution Drawings: Show point loads and recommended method of unit installation.

.4 Fan Performance Data: Submit fan performance curves as well as performance tables.

.5 Coils: Selection criteria indicating air side and fluid side capacities, in and out conditions, velocities, pressure drops and fouling factors. Submit a drawing showing headers, circuiting arrangement, connection sizes, and materials of construction.

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

.7 Vibration isolator shop drawings.

.8 Table indicating pressure drops through all components of the unit.

.9 Damper shop drawings.

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

.11 Sound Levels: Submit sound power levels generated by the air handling unit at the inlet and outlet of the unit and outside the fan section. List for individual octave bands in dB referenced to A rating.

2. PRODUCTS

2.1 General

.1 The units shall be factory assembled and tested; designed for outdoor roof installation; and consisting of the following components:

.1 Supply fans.

.2 Return fans.

.3 D/X Cooling coil.

.4 Final filter.

.5 Motorized exhaust air section.

.6 Motorized outdoor air section.

.7 Motorized return air section.

.8 Access sections.

2.2 Cabinet

.1 The cabinet shall be constructed entirely of G90 galvanized steel with the exterior constructed of 18 gauge or heavier material.

.2 The interior air side of the cabinet and base rail shall be entirely insulated on all exterior panels with 50 mm (2 inch) thick, 24 kg/m^3 (1-1/2 lb/ft^3) density fibreglass insulation covered with a metal liner. Insulate underside of unit floor with 50 mm (2 in) thick rigid fibrous glass insulation 24 kg/m^3 (1-1/2 lb/ft^3) density. Hold in place insulation with welded pins 400 mm (16 in.) centre. Line insulation with 22 gauge perforated liner, if roof curb used as return air plenum.

.3 The unit roof shall be sloped to assure drainage.

.4 A walk-in compartment shall contain the electrical control panel. The compartment shall be provided with a fluorescent light fixture with a wire guard. The light shall be controlled by a wall switch and shall remain energized regardless of the position of the main power switch.

.5 Unit specific colour coded wiring diagrams shall match the unit colour coded wiring and shall be provided in both point to point and ladder form.

.6 Diagrams shall be laminated in plastic and permanently affixed inside the control compartment.

2.3 Access Doors

.1 Provide hinged man sized access doors. Door construction to be the same as casing. Provide minimum two (2) latches per door openable from both sides. Doors to be sealed with neoprene gasketting (foam gasketting not acceptable). Door hinge to be continuous stainless steel hinges. Door sizes to be 750 mm (30 in.) x 1800 mm (72 in.) or as limited by height of unit. Provide access doors for the following sections.

.1 Fan sections

.2 Cooling coil section

.3 Filter section

.4 Mixing section

2.4 Finish

.1 The paint finish shall be capable of withstanding at least 20 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure.

.2 The unit exterior colour shall be Grey in colour.

2.5 Marine Lights

.1 Provide marine type lights in all sections having an access door on all units. Lights shall be factory installed and wired to a single lighted switch located in the control compartment.

.2 Wire power connection for all lights to one point for connection by Division 16.

.3 Light to be fed from a separate source so that the lights are operative even when the unit is off.

2.6 Drain Pans

.1 For stacked coils, provide a separate drain pan under each coil. Provide a secondary drain pan extending under the entire access section downstream of the cooling coil. Pipe all drains to the exterior side of unit.

.2 Drain pans shall be fabricated from 304 stainless steel.

2.7 Roof Curbs

.1 Provide a 25 mm (2 in.) x 19 mm (3/4 in.) closed cell neoprene sealing gasket to seal the perimeter joint between roof curb and air processing unit.

2.8 Supply Fans

.1 The fans to be direct drive single width inlet un-housed airfoil centrifugal, plenum fans.

.2 Supply fans to be all aluminum construction and rated class II.

.3 Fans attached to 1750 rpm motors shall be rated for a minimum of 1800 rpm speed.

.4 Direct drive fans shall be directly connected to and supported by the motor shaft.

.5 Motor bearing life rating: L_{10} – 200,000 service hours.

.6 Motor bearings shall have external lubrication connections.

.7 Fans and motors to be dynamically balanced.

.8 The entire fan assembly to be mounted on spring isolators.

2.9 Return Fans

.1 The return fans to be axial flow direct drive fans.

.2 Return fans to be all aluminum construction with adjustable blade pitch.

.3 Direct drive fans shall be directly connected to and supported by the motor shaft.

.4 Motor bearing life rating: L_{10} – 200,000 service hours.

.5 Motor bearings shall have external lubrication connections.

.6 Fans and motors to be dynamically balanced.

.7 The entire fan assembly to be mounted on spring isolators.

2.10 Filters

.1 Filters containing asbestos, and urea formaldehyde are not acceptable.

.2 50 mm (2 in.), pleated filter, average efficiency 25-30% on ASHRAE Test Standard 52-76. Non-woven cotton and synthetic fabric media.

.3 Mounting racks to be galvanised, to suit specified filter type.

.4 Limit filter velocity based on face area to less than 2.5 m/s (500 fpm).

.5 Provide one Dwyer 2000 magnehelic filter gauge for each bank of filters, including for each position of prefilter. Flush mount gauge on the exterior of the unit. Gauge shall be suitable for outdoor operation.

2.11 Evaporator Coils

.1 Evaporator coils shall be rated in accordance with ARI Standard 410.

.2 Enclose coils in coil section with headers and U-bends fully contained within the casing.

.3 Extend coil supply and return header connections, through base of the unit and drain and vent fittings through casing. Coil connections shall be of same material as the coil headers.

.4 Coil racks to be angle iron, providing completely independent support for each coil. Each coil is to be separately removable without disturbing the other coils. Provide removable coil access panels in the unit casing.

2.12 Dampers

.1 Low leakage type dampers with hollow blades filled with extruded polyurethane insulation.

.2 Blades shall be minimum 12 gauge extruded aluminum. Blades shall be of air foil design, 150 mm (6 in.) side. Maximum blade length 1200 mm (48 in).

.3 Damper seals shall be designed for minimum air leakage by means of overlapping seals.

.4 Frames shall be minimum 12 gauge extruded aluminum channel with grooved inserts for vinyl seal.

.5 Install blade linkage hardware in frame out of air stream. Use cadmium plated steel hardware.

.6 Arrange linkage and provide an adequate number of damper operators to ensure that the interconnected damper sections operate in unison without binding.

.7 The outdoor, return and exhaust dampers shall be integral part of the Air Handling Units and shall be supplied and installed by the Air Handling Unit manufacturer at the factory.

.8 Damper operators shall be supplied by controls contractor and installed by the Air Handling Unit manufacturer at the factory, in accordance with instructions from controls contractor.

2.13 Pre-wired Equipment and Factory Installed Controls

.1 Units shall be factory wired and tested, and shall be certified by C-ETL.

.2 All electrical circuits shall undergo a dielectric strength test and shall be factory tested and checked as to proper function.

.3 Pre-wired units shall bear an approved label with all the necessary identification marks, electrical data and all necessary cautions as required by the National Electrical Code, Part 2.

.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. Provide also condensing unit control interface.

.5 The system shall be energized and de-energized for operation through the building ventilation control panel.

2.14 Electrical

.1 Conform to CSA B52-M1977 and UL 465-1978 requirements.

.2 Electrical/controls:

.1 Electrical system shall have operating controls, and motor overload protection. Wiring shall be weather proofed: mount all controls, transformers, disconnects, starter, etc. in a weatherproof rain tight cabinet.

2.15 Air Inlet Hood

.1 Provide inlet hood on outside air intake opening of the unit.

.2 Provide removable galvanized 13 mm x 13 mm (1/2 in x 1/2 in) mesh bird screen and a removable aluminum insect screen to replace bird screen for summer operation.

3. EXECUTION

3.1 Assembly

.1 Units are to be one-piece construction. Mount units on concrete curb. Roof curb to be fully insulated prior to lowering unit on curb.

.2 Pipe units to permit coil removal.

.3 Any piping or conduit passing through the unit casings must be sealed with rubber grommets and retaining plates to prevent air or water leakage.

.4 Insulate all piping as per Section 15200.

3.2 Air Handling Unit Schedule

.1 Refer to Equipment Schedules.

END OF SECTION