PART 1 GENERAL

1.1 REFERENCES

.1 American National Standards Institute/Air-Conditioning and Refrigeration Institute (ANSI/ARI)

.1 ANSI/ARI 430-99(R2002), Central-Station Air-Handling Units.

.2 American Society of Heating, Refrigeration and Air Condition Engineers (ASHRAE)

.1 ANSI/ASHRAE 90.1-2007, (I-P) Energy Standard for Buildings Except Low-Rise Residential Buildings.

.2 ANSI/ASHRAE 52.2-2007, Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.4 Green Seal Environmental Standards (GSES)

.1 Standard GS-11-07, Environmental Standard for Paints.

.5 Master Painters Institute (MPI)

.1 MPI-INT 5.3-2007, Galvanized Metal.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for insulation, filters, adhesives, and paints, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Indicate following: fan, fan curve showing point of operation, motor drive, filters, mixing box, dampers, and coil; include performance data.

.2 Provide a refrigerant piping flow schematic complete with pipe sizes, load capacity calculations demonstrating full-

load pressure drops and minimum flow velocities demonstrating adequate oil return, location of pipe appurtenances and suggested arrangement of piping and hook-up details such as hot-gas piping configurations, etc., power and control wiring schematics.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

.2 Include following: fan, bearings, motor, dampers, air volume and total cooling.

1.4 MAINTENANCE MATERIAL SUBMITTALS

.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide one spare set of filters.

.3 Spare filters: in addition to filters installed immediately prior to acceptance by Contract Administrator, supply 1 complete set of filters for each filter unit or filter bank.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section01 61 00 - Common Product Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, paddling and packaging materials in accordance with Section 01 74 00 - Cleaning and Waste Management.

PART 2 PRODUCTS

2.1 GENERAL

.1 Factory assembled components to form units supplying air at designed conditions, as indicated.

.2 Certify ratings: to ANSI/ARI 430 with ARI seal.

.3 Horizontal type, as indicated, having air tight modular components, consisting of casing, fan section with motor and drive, filter section, dampers, cooling coil and mixing box.

.4 Approved Product: Haakon Industries or approved equal in accordance with B6.

2.2 CASINGS

.1 Galvanized steel thickness as indicated reinforced and braced for rigidity.

.2 Removable panels Inspection doors Walk-in access doors: provide access for maintenance of internal parts.

.3 Paint steel parts, where not galvanized, with corrosion resistant paint to CAN/CGSB 1.181 MPI-INT 5.3A.

.4 Line casing with solid steel liner.

2.3 ACOUSTIC LINER

.1 Ensure that expanded polystyrene and polyurethane insulation materials were not produced with ozone depleting substances.

.2 Insulate internal surface of panels with 50mm neoprene coated rigid duct liner of 72kg/m³ density.

2.4 DRAIN PANS

.1 Construction: stainless steel. Rounded corners.

.2 Insulation: external foam type, minimum 13 mm thick.

.3 Drain connection: in bottom at low point.

.4 Installation: slope without sag minimum 1% to ensure no standing water at any time or at any point.

.5 Dimensions: minimum 75 mm from upstream face of coil to 150 mm beyond downstream face of coil or eliminator and to include return bends and headers.

2.5 FANS

.1 Capacity:

.1 Airflow: 1300 L/s

.2 T.S.P: 373 Pa

.2 Free standing centrifugal fans with backward inclined wheels, selected to operate in stable part of performance curve at times and heavy duty 100,000 200,000 hours service self-aligning split pillow block bearings.

.3 Provide internally mounted motor as indicated complete with adjustable V-belt drive and guard.

.4 Motor: 1.12 kW, 1750 r/min.

.5 Maximum sound power levels, as indicated.

.6 Internally mounted motor and fan.

2.6 VIBRATION ISOLATION

.1 Flexible connections at inlet and outlet of fan section: to Section 23 33 00 - Air Duct Accessories.

.2 Vibration isolators as indicated: in accordance with Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.

2.7 FILTER BOX

.1 Material to match casing. For type filter arrangement: as indicated.

.2 Provide access to filter through hinged door with suitable hardware.

.3 Provide blank-off plates and gaskets to prevent air bypass.

.4 Disposable fibrous glass media: to CAN/CGSB-115.10 with adhesive.

.5 Holding frame: 1.2 mm minimum thick galvanized steel with 3 mm diameter hinged wire mesh screen.

.6 Performance: minimum average synthetic dust weight arrestance 90> % to ASHRAE 52.1, MERV 7.

.7 Fire rated: to ULC -S111, Class 2.

.8 Nominal thickness: 50 mm.

.9 Acceptable product: AAF PerfectPleat or approved equal in accordance with B6.

2.8 MIXING BOX

.1 Material to match casing and produce uniformly mixed air temperature within plus or minus 5°C of design across face of outlet.

.2 Dampers:

.1 Galvanized steel, factory manufactured to AMCA Std 99-2408 Class II pressure class.

.2 Parallel blade: double skin air foil design, 1.6 mm thick 316 galvanized steel to 1200 mm length, 2 mm thick to 1500 mm length. Insulated blade on outdoor dampers.

.3 Axle: minimum 19 mm diameter stainless steel rod.

.4 Maximum blade height: 150 mm.

.5 Bearings: stainless steel outboard bearings with shaft seals pressed into cast housing bolted to the damper frame.

.6 Linkage: located in jamb out of airstream and constructed of minimum 3.5 mm stainless steel double clevis arms with 4.8 x 19 stainless steel tie bars pivoting on 9.5 mm diameter stainless steel pivot pins with lock type retainers.

.7 Seals: low temperature-low leakage, silicone blade seals shall be mechanically attached to blade. Jamb seals shall be flexible stainless steel located between blade edge and jamb for maximum sealing compression.

.8 Channel frame: minimum 200 mm deep x 50 mm flanged, 2.8 mm galvanized steel.

.9 Performance:

.1 Leakage: in closed position less than 2% of rated air-flow at 500 Pa differential across damper.

.2 Pressure drop: at full open position to unit manufacturer’s standard.

.10 Acceptable Products: Tamco or approved equal in accordance with B6.

.11 Damper Actuator:

.1 Direct coupled, modulating, spring return for damper operation.

.2 Self centered shaft adaptor.

.3 Fully opened and fully closed integral end-limit switches. Number of limit-switches required shall be determined from Process & Instrumentation Diagrams.

.4 Spring return direction field selectable.

.5 Torque ratings 125% (minimum) of breaking torque to initiate opening/closing at maximum pressure differential.

.6 Voltage feedback signal; 4-20mA.

.7 Control circuit and status operating voltage, 24Vdc.

.8 Operating voltage; actuator motor 24Vdc.

.9 Outdoor located damper actuator with thermostatic electric heater.

2.9 HEATING COIL

.1 Heating Coil Capacity: 77.7 kW.

.2 Construction:

.1 Casings: 1.5 mm thick galvanized sheet steel.

.1 Supports of galvanized steel channel.

.2 Blank-off plates. Insulated sandwich construction.

.2 Hot water coils: cleanable fins.

.1 Tubes: copper brass steel.

.2 Fins: copper aluminum plate spiral wound.

.3 Headers: cast iron, steel or cast brass.

.4 Pressure tests: 1.7 MPa.

2.10 DX (Direct Expansion) COOLING COIL

.1 Total Capacity: 27.2 kW

.1 EAT db/wb: 32°C/22°C

.2 LAT db/wb: 18°C/18°C

.3 Air flow: 1300 L/s

.2 Coil shall have the connections located to permit universal mounting of the coil for right- or left-hand airflow and have equal pressure drop through all circuits. Coils shall be circuited for counterflow heat transfer to provide the maximum mean effective temperature difference for maximum heat transfer rates

.3 Coil shall be tested with 315 pounds air pressure under warm water, and be suitable for 250 psig working pressure. Hydrostatically tested will not be permitted. Coil shall be ARI certified and Underwriters' Laboratories recognized. Coil shall be circuited in a counterflow manner with uniform circuits.

.4 Contractor shall provide DX cooling coil and air cooled condenser from same supplier and ensure that both the coil and condenser are suitably matched to provide the total capacity indicated.

.5 Acceptable Product: McQuay Model E-F5 or approved equal in accordance with B6.

2.11 AIR COOLED CONDENSER

.1 Cabinet: constructed of galvanized steel, bonderized, and coated with a powder coat paint; provided with a dense grille.

.2 Fan: direct drive, propeller type, upward discharge. Totally enclosed, single-phase type with class B insulation and permanently lubricated bearings. Shafts will be corrosion resistant. Fan blades to be statically and dynamically balanced. Condenser fan openings will be equipped with coated steel wire safety guards.

.3 Compressors (2): to be hermetically sealed scroll type; mounted on rubber vibration isolators, crankcase heaters.

.4 Condenser coil: constructed of aluminum fins mechanically bonded to copper tubes which are then cleaned, dehydrated, and sealed; air cooled.

.5 Refrigeration components: circuit components will include, hot-gas bypass on lead compressor, liquid-line shutoff valve with sweat connections, vapour-line shutoff valve with sweat connections, filter-drier, TX and solenoid valves, hot-gas bypass valve including capillary tubing, system charge of R-410A refrigerant, and compressor oil.

.6 Control Components: Unit will be equipped with safety high-pressure switch, low pressure switch, filter drier for refrigerant and packaged operating controls capable of operation from PLC enable-disable command only.

.7 Capacity of condenser to be matched to DX coil capacity.

.8 Electrical: 575/3/60

.9 Acceptable Product: Aaon Model CC-B-008-C-2 or approved equal in accordance with B6.

PART 3 EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Provide appropriate protection apparatus.

.2 Install units in accordance with manufacturer's instructions and as indicated.

.3 Ensure adequate clearance for servicing and maintenance.

3.3 FANS

.1 Install fan sheaves required for final air balance.

.2 Install flexible connections at fan inlet and fan outlets.

.3 Install vibration isolators.

3.4 DRIP PANS

.1 Install deep seal P-traps and trap seal primer on drip lines.

.2 Depth of water seal to be 1.5 times static pressure at this point.

3.5 CLEANING

.1 Clean in accordance with manufacturer’s published procedures.

END OF SECTION