

1. PART 1 – GENERAL

1.1 Scope of work

- .1 Custom built air handling units shall be supplied to meet the performance requirements shown on the equipment plans and specifications. To comply with job site constraints and/or freight restrictions, the units shall be shipped, in modules, as indicated on the plans, ready for field installation. Shipping details shall be coordinated and included with submittal drawings.
- .2 Prior to shipment from the factory manufacturing plants will be inspected by the Departmental Representative.
- .3 The Contractor will be responsible for the assembly of the modular sections, setting up on site, the seal between the modules and the start-up. Upon request, the presence of a representative of the manufacturer may be required.
- .4 The manufacturer shall warranty the equipment, parts only, for a period of one year commencing at the date of unit start-up, up to a maximum of 18 months from the date of shipment.
- .5 The unit UC-1 should be delivered in (2) two modular sections (minimum) and its assembly shall not have a final more than 2 600mm length (see drawings).

1.2 References

- .1 The design and fabrication of the units shall be in accordance with the latest standards listed here:
 - .1 AFBMA 9 Load ratings and fatigue life for ball bearings
 - .2 AMCA 203 Field performance measurements
 - .3 AMCA 210 Laboratory methods of testing fans for rating purposes
 - .4 AMCA 300 Test code for sound rating air moving devices
 - .5 AMCA 500 Test methods for louvers, dampers and shutters
 - .6 ARI 410 Forced-circulation air cooling and air heating coils
 - .7 ASHRAE 62-89 ventilation for acceptable indoor air quality
 - .8 ASTM A525 Steel sheet, zinc coated by hot-dip process
 - .9 ASTM E90-90 Standard Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
 - .10 NEMA MG1 National electrical manufacturers association (Motors and generators)
 - .11 NFPA 70 National fire protection code
 - .12 NFPA 90A Installation of Air Conditioning and Ventilation Systems
 - .13 OSHA Occupational safety and health administration
 - .14 SMACNA HVAC metal duct association
 - .15 UL 900 Underwriters laboratory, (test performance of air filters quality)
- .2 Drawings shown on project plans and specifications.
- .3 Equipment schedules shown on project plans and specifications.

1.3 Quality assurance

- .1 The air flows, external static pressure, static pressure must be the selection criteria, and as specified. The pressure loss is obtained must inside 10% of the specified value.
- .2 The units shall be produced by a manufacturer whose design and processes are thoroughly documented and verifiable. The quality control program shall ensure the consistency of the product and the effectiveness of the production processes.
- .3 Components must be sourced from well recognized HVAC manufacturers whose products comply with their product-specific industry standards.
- .4 Performance fans should be in conformity with the standards of testing and construction of the MCAA.
- .5 The performance of cooling coils, heating and recovery must be certified in accordance with the standard 410 of the ARI and bear the seal.
- .6 Filter media shall be ULC listed.

1.4 Submittal drawings

- .1 The unit manufacturer shall provide submittal drawings showing the arrangement of each unit, nominal dimensions, weight of each shipping module and complete technical data for all mechanical and electrical accessories provided with the HVAC units.
- .2 The drawings shall detail the cross-section of the floor, perimeter structure, panel assembly, sealing between panels and detailing of all components including the material and thickness of all cabinetry components.
- .3 Datasheets fans should include operating curves with operating point clearly defined. For reference purposes, a family of performance curves shall be included for each fan. Sound power levels shall be provided for the fan inlet and discharge at each octave band. Construction drawings for each fan shall be included with the submittal drawing file.
- .4 Coil selection data for each coil shall be included with the submittal drawing file including the physical dimensions.
- .5 A detailed description of the filters including their “dust spot” efficiency, initial and final pressure losses for each filter bank shall be provided with the submittal drawings.
- .6 The unit manufacturer shall provide technical data for all other equipment being part of the air handling system. The data shall include: Performance and capacity information; certified drawings, clearly showing the general arrangements.
- .7 The manufacturer shall provide submittal drawings in english and in french.

1.5 Delivery, storage and handling

- .1 The units shall be thoroughly cleaned and inspected before applying a shrink wrapping protective cover. The plastic cover must completely enclose all shipping modules individually.
- .2 The units must be shipped completely assembled or in modules, as documented in the specifications or instructed by the contractor. The units and/or modules shall be equipped with adequately sized and removable lifting lugs for field rigging and handling.
- .3 The units must be handled carefully in the field to avoid damaging internal components, cabinet walls and the exterior finish.
- .4 Store the units in a dry, clean environment protected from the outdoor weather. Factory applied shrink wrap is intended to protect the units while in transit to the job site. The units must not be stored with the factory applied shrink wrap.
- .5 The units must not be operated, for temporary or permanent purposes, until the official start-up is completed by the mechanical contractor and witnesses by a manufacturer’s representative.

2. PART 2 - PRODUCTS

2.1 Acceptable products

- .1 The technical specifications of HVAC package units are based on air handling units of Trane of Uni-Trane series. The following manufacturers are approved to provide an equivalent product to the specified manufacturer: Johnson Controls, Carrier or Enviroair.

2.2 Performance

- .1 Provide factory fabricated air handling units having overall dimensions as shown on the construction plans.
- .2 Refer to the item 2.7 "Unit no.5-082-VA1 to determine the performance of all following components: Fans, coils, filters and acoustical performance.
- .3 The indicated total static pressure for each fan must be equal to the sum of the external static and the internal static, including all internal system effects.
- .4 All deviations from the specification must be clearly indicated on the submittal drawings. The contractor shall be held responsible for all additional expenses associated with the deviation.

2.3 Construction

- .1 Casing
 - .1 Casings (structural components) are constructed of minimum 18-gauge galvanized steel with rounded exposed edges. Units are provided with eyes at the corners to be hanged with supporting rods from the ceiling.
- .2 Air outlets
 - .1 Units equipped with air outlets for tight duct connections.
- .3 Casing insulation
 - .1 The interior surface of the unit 5-082-VA1 is acoustically and thermally lined with one inch (25 mm) 1 1/2 lb/cu. ft, (R-Value of 4.2) density glass fiber with a foil facing.
- .4 Access
 - .1 The unit shall be equipped with access doors located on sides of the air handler and allow easy maintenance on the motor, drives, filters, coil and the mixing box.
- .5 Filter
 - .1 The units are equipped with 25 mm flat pleated media filters with MERV 8 efficiency, complying to ASHRAE 52.2 standard.
- .6 Hydronic coils
 - .1 All water coils are 12 fins per inch., all aluminum fins, mechanically bonded to seamless copper tubes. All coils are specifically designed and circuited for water use. All coils are factory tested with 450 psi air under water. Maximum standard operating conditions are : 300 psig, 200°F, sweat type connections are standard.
- .7 Drain pan
 - .1 The drain pan is noncorrosive and double-sloped to allow condensate drainage as per ASHRAE 62-89R std. The drain pan construction is stainless steel.
- .8 Motor
 - .1 A 60 Hertz, "E.C.M." three speed thermally protected motor has a plus or minus 10% voltage utilization range. The motor is with permanently sealed ball bearings will operate quietly. An external selector mounted on the unit allows to choose the selected speed.

.9 Fan

- .1 The fans corrosion resistant, double inlet are forward curved, centrifugal blower type equipped with heavy-duty adjustable speed V-belt drives. The fan shaft is supported by heavy-duty, permanently sealed ball bearings. All fans are dynamically balanced. All air handlers have a single fan.

.10 Control

- .1 The units are completely externally controlled. Terminal blocks shall be provided for connection by the control sub-contractor.

2.4 Filters

- .1 Filter types, efficiencies and quantities shall be provided according to the project specifications only the prefilters and filters with standard market dimensions will be considered acceptable by the Departmental Representative.
- .2 Prefilters and filters must be side-loading when no access section upstream of the filtration bed. The slides must be manufactured using galvanized steel. The gateway filters must be of similar construction to the other gates of the central HVAC.
- .3 Supply and factory install, for each filter bank, pressure differential manometers manufactured by « Dwyer », Magnehelic series 2000.
- .4 Acceptable Products: Farr, 30/30 or approved equivalent, UL Class 2, tested per ASHRAE 52.2.

2.5 Multi-blade dampers

- .1 Mixing boxes and economizers shall be equipped with parallel blade dampers. The damper blades shall be positioned to orient the air streams against each other to promote air mixing within the section.
- .2 The dampers' maximum air leakage rate shall be certified by AMCA standard 511.
- .3 The damper frames shall consist of pre-fabricated aluminum extrusions.
- .4 The damper blades shall be airfoil type, double wall and be made of aluminum extrusions.
- .5 Air seal gaskets shall be made of synthetic rubber type TPE and EPDM.
- .6 All drive shafts shall be located out of the air stream and it shall be possible to install the actuators inside the cabinet without interference to the air flow.
- .7 All dampers shall be by Tamco series 1000 on return air and series 9000 on fresh air, or equivalent from TROLEC.

2.6 Electrical

- .1 When the units are delivered in modules, they must be provided with junction boxes to facilitate connection to the construction performed by the electrical contractor. The wiring provided in sufficient quantity, should be available near the junction boxes.
- .2 To avoid piercing the walls to the site, the manufacturer must conduct factory connecting electric motors. The wiring will be brought up engines through electrical conduit galvanized rigid type EMT fittings. Near the engine, providing a flexible conduit to a length of 600mm. Provide junction box mounted on the extern fan module with sufficient wiring length for easy connection to the site.

2.7 Unit no. 25-082-VA1 (elevator machine room air-conditioning)

- .1 Unit model FCCB0601C**F0A00BH4A00 of Trane, size 060, horizontal, c/w insulated mixing box, suspension springs, corners suspension angles with (4) 5/8" diameters holes for rods, weight of 60 kg.
- .2 Supply Fan
 - .1 Air flow: 179 l/s
 - .2 TPM: 1342 adjustable with the selector
 - .3 Direct driven
 - .4 External Static Pressure: 110 Pa
 - .5 BHP: 0.22
 - .6 Motor HP: ¼ HP, 115/1/60, MCA = 3.88A, MOCP = 15.00, ECM type c/w integrated controller with tachometer
- .3 Coling coil
 - .1 Total capacity: 11.46 MBH
 - .2 Sensible capacity: 8.72 MBH
 - .3 EAT-DB (°C) / EAT-WB (°C): 26.7/19.4
 - .4 LAT-DB (°C) / LAT-WB (°C): 14.6/14
 - .5 Chilled water flow: 0.15 l/s (2.33 gpm)
 - .6 EWT (°C) = 7.77
 - .7 LWT (°C) = 13.33
 - .8 Water pressure drop: 6.8 kPa
- .4 Filter
 - .1 Type: FARR 30/30, 25 mm thickness
 - .2 Efficiency: MERV-8
- .5 Sound attenuation:
 - .1 The following performances are for a ducted outlet unit.
 - .2 Radiated noise:

dB per octave band (Hz)						
125	250	500	1 000	2 000	4 000	8 000
66	64	64	61	56	54	48

PARTIE 3 - EXECUTION

2.8 Installation

- .1 Install the unit on site according to the manufacturer's installation manual material handling instructions.
- .2 Ensure mounting bases are level and in accordance with approved dimensions.
- .3 Remove gussets, hold-down bolts and shipping fasteners.
- .4 Mechanical contractor shall provide and install adequately sized P-traps for all condensate pipe connections. Disposal of condensate shall be connecting to the drain.
- .5 Check fan motors for rotation and amp draw for each phase. Record information on the start-up data sheets. Belt drives should be adjusted for tension and alignment.