

SECTION 15745

WATER SOURCE UNITARY HEAT PUMPS

PART 1 –GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to the Work of this Section.

1.2 SECTION INCLUDES

- A. Vertical heat pump units.
- B. Horizontal heat pump units.
- C. Controls and control panels.

1.3 REFERENCES

- A. ANSI/ASME - Boilers and Pressure Vessels Code
- B. ANSI/NEMA 250 - Enclosures for Electrical Equipment (1000 volts maximum)
- C. ANSI/NFPA 90A - Installation of Air Conditioning and Ventilation Systems
- D. ASHRAE 52 - Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter
- E. FS TT-C-490 - Cleaning Method and Pretreatment of Ferrous Surfaces for Organic Coatings
- F. UL - Underwriters Laboratories

1.4 REGULATORY REQUIREMENTS

- A. Conform to ANSI/NFPA 90A for the installation of computer room air conditioning units.

1.5 SUBMITTALS

- A. Submit product data under provisions of Section 01330.
- B. Submit product data for manufactured products and assemblies required for this project

C. Indicate water, drain, electrical and refrigeration rough-in connections on product data.

D. Submit manufacturer's installation instructions under provisions of Section 01330.

1.6 WARRANTY

A. Provide a minimum one year manufacturer's warranty.

B. Warranty: Include coverage of entire unit.

1.7 EXTRA MATERIALS

A. Provide one set of filter.

PART 2 –PRODUCTS

2.1 VERTICAL HEAT PUMP – MANUFACTURERS

A. Mammoth

B. McQuay

C. or equal.

2.2 GENERAL

A. Self-contained heat pump unit ventilator. The unit shall be vertical floor-mounted or suspended type. The unit shall be engineered to provide one stage of free cooling, one stage of mechanical cooling with an option for hot gas bypass. Heat pump unit ventilators shall also have one stage of mechanical heating with automatic defrost control.

B. The unit ventilator shall be constructed in accordance with ETL & CSA standards and a label shall be affixed to the unit listing the product code under which it is registered.

C. The unit shall be a product of a recognized quality control program and be fully assembled and tested prior to shipment. The supplier of the unit ventilator shall have five years' experience manufacturing the submitted product.

2.3 CABINET

A. The cabinet shall be constructed from 10-gauge galvanized sheet steel. After assembly, the cabinet shall be degreased and coated with a textured, dry power epoxy resin paint, baked after application. The paint finish shall be easily cleanable and hard wearing to give maximum protection. The cabinet shall be insulated with 1 inch acoustic foam insulation containing no fibrous materials. The foam insulation shall have a fire rating of UL94HF-1.

- B. The front of the unit shall contain a tamperproof return air grille that is integral to the front door. Each side shall contain two removable side panels with lifting inserts. The front door shall be hinged with a spring-loaded pin to allow for easy removal if required. All the panels and the front door shall be secured with a keylock. Mounted on top of the cabinet shall be a terminal box to enable field connection of power supply and all necessary control wiring. The terminal box shall contain dinrail mounted terminal blocks clearly identified.
- C. A condensate connection stub of copper tube shall be provided through the rear of the base for connection to the field installed building condensate drain.
- D. The unit shall be mounted on four swivel casters to allow positioning of the unit. Adjustable feet shall be installed to level the unit once installed. A floor skirt shall be supplied to conceal the castors and leveling feet once installed.

2.4 REFRIGERATION SYSTEM

- A. The refrigerant system shall consist of a hermetic heat pump grade compressor equipped with a crankcase heater to guard against liquid floodback conditions and the elimination of oil foaming upon startup. The compressor shall be mounted on vibration absorbers and be fitted with an acoustic cover for quiet operation. An internal thermal overload protector shall protect the compressor against excessive motor temperature and current.
- B. The refrigeration circuit shall contain: An externally equalized expansion valve, liquid solenoid valve, sight glass and filter drier fitted. The unit shall be fitted with two externally equalized expansion valves, each with a check valve assembly to prevent short cycling of refrigerant during the heat pump operation. A reversing valve and actuating coil enable the unit to operate in both the cooling and heat pump mode. A large capacity suction accumulator shall protect the system against liquid floodback. A filter drier and sight glass shall also be fitted.
- C. All units shall be fitted with high and low pressure switches, accessible from the front of the unit. The AVUH unit shall have adjustable switches with manual resets. The AVUX unit has adjustable switches with a manual reset high pressure switch and an automatic reset low pressure switch.
- D. The evaporator and condenser coils shall be constructed of aluminum fins mechanically bonded to 3/8 inch copper tubes. Both coils shall be fitted with high impact plastic drain trays.

2.5 FANS AND FAN MOTOR

- A. The evaporator fan(s) shall be statically and dynamically balanced for quiet operation. Supply air shall be delivered with fan(s) and one direct motor assembly. The fan wheel(s) shall be the forward curved centrifugal type made from cold rolled steel. Each fan housing shall be steel construction.
- B. The fan motor(s) shall contain an integral thermal overload with automatic reset. The fan shaft shall have lubricated sleeve bearings. A manually adjustable fan speed selector switch shall allow supply fan speed selection for three speeds. The unit shall be capable of operating in any mode at any speed. The selector switch shall be mounted on the unit front door.
- C. The unit shall be fitted with a 1 inch thick disposable pleated filter designed to meet ASHRAE standard 52/6.

2.6 CONTROL PANEL

- A. The control panel shall be accessible from the front of the unit and contain a 24-volt control circuit transformer and all necessary contactors, relays and fuse blocks to provide automatic control. All components located in the panel shall be clearly marked for easy identification. All terminal blocks and wires shall be individually numbered. All electrical wires in the control panel shall be run in an enclosed trough. Wiring outside the control panel shall be run in protective sleeving. The unit ventilator shall be supplied with a factory-mounted microprocessor control system.

2.7 UNIT AND CONTROLS

- A. Each unit is designed to be controlled via a programmable microprocessor controller fitted outside of the airstream and specifically designed to operate in an energy-efficient manner according to ASHRAE Cycle #2. The controller shall determine the mode of unit operation to be free cooling. DX or auxiliary dependent upon space and ambient temperatures.
- B. Control features that the microprocessor shall include the following:
 - 1. Night Setback
 - 2. Occupied/Unoccupied Mode of Operation
 - 3. Timed Override Facility
 - 4. Morning Warmup
 - 5. Compressor Anti-Cycle Timing
 - 6. Defrost Control
 - 7. DX Heat Pump Low Ambient Lockout
 - 8. Scheduling, including Vacations/Holidays

2.8 HORIZONTAL INDOOR HEAT PUMP – MANUFACTURERS

- A. Mammoth
- B. McQuay
- C. or equal.

2.9 GENERAL

- A. Self-contained horizontal heat pump unit.

2.10 CABINET

- A. Heavy gauge zinc coated galvanized steel.
- B. Insulation: Thermally and acoustically lined cabinet interior; 1 inch thick acoustic liner.
- C. Doors and Access Panels: Size access, steel construction with polyurethane gaskets, hinges.

2.11 EVAPORATOR FANS AND MOTORS

- A. Fans: Double inlet, forward curved centrifugal fans, statically and dynamically balanced on steel shaft with self-aligning grease lubricated ball bearings, and V-belt drive.
- B. V-Belt Drive: Cast iron or steel sheaves, dynamically balanced, keyed, variable and adjustable pitch motor sheave, minimum belts, drive rated minimum 2.0 times nameplate rating of motor.

2.12 COMPRESSORS

- A. Semi-hermetic with suction gas cooled motors, vibration isolators, thermal overloads, oil sight glass, manual reset high pressure switch, pump down low pressure switch, suction line strainer, reversible oil pumps, 1750 rpm.
- B. Compressors shall be individually serviceable without dismantling other components or removing unit from service.
- C. The compressor shall include vibration isolators, thermal overloads, oil sight glass, manual reset high pressure switches, pump down low pressure switch, suction line strainer, and reversible oil pumps for forced feed lubrication. They shall have a maximum operating speed of 1750 rpm.

2.13 EVAPORATOR COILS

- A. Direct expansion cooling coils of seamless copper tubes expanded into aluminum fins, in A-frame configuration.

2.14 FILTERS

- A. Media: Pleated, lofted, non-woven, reinforced cotton fabric; supported and bonded to welded wire grid; 2 inch nominal thickness.
- B. Rating: ASHRAE 52; 25-30 percent dust spot efficiency, 90-92 percent weight arrestance; 500 feet/minimum face velocity, 0.30 inch wg initial resistance, 1.0 inch wg recommended final resistance.

PART 3 –EXECUTION

3.1 EXAMINATION

- A. Verify system is ready to receive work and opening dimensions are as instructed by manufacturer.
- B. Verify that proper power supply is available.

3.2 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Provide adequate drainage connections for condensate.

END OF SECTION