VARIPAK MAKE UP AIR UNIT

Models "VPA/VPR" Guide Specifications

PART 1 General

General Specification – BULLDOG Make Up Air Unit

PART 1 System Description

1.1 The HVAC system is based on the CGC Heat Pump System.

1.2 The system will automatically provide the availability of heating or cooling functions 24 hours a day, 365 days a year without need for a changeover. The system is designed to function with 85°F supply hydronic fluid temperature at ambient conditions of 55°F and above. Below 55°F ambient the fluid loop temperature is elevated at a rate of approximately 1°F for each 2°F drop in ambient (i.e. the slope is equal to 0.5). The units shall be designed to provide heating without the use of the compressor. The fluid temperature rate of change (slope) will be adjusted during commissioning to best follow the building heating requirements.

1.3 **Flow Systems**

All units are supplied with a 3-way valve for continuous flow.
1.3.1 (OPTIONAL)

A) The designer has selected the system to be a variable flow system; each unit shall be equipped with valve arrangement capable of shutting off fluid flow during periods of no call. Units shall also include an automatic flow limiting device to maintain the specified fluid flow during operating periods.
B) During an off cycle where the fan is off the fluid circulates at 50% flow rate in order to keep the heat exchangers warm.

1.4 Model selection and performance shall be in accordance with the schedule on the drawings.

1.5 Each unit shall be pressure tested on both the refrigerant and fluid (water) circuits followed by a helium leak detection program for both circuits.

1.6 Units shall be safety certified and bear a seal of approval from one of UL/ULC/ETL or ESA.

1.7 Manufacturer shall warrant the parts only of each unit for a period of 12 months from the start-up date or 18 months from the unit shipment date whichever occurs first.

1.8 Commissioning of the CGC unit(s) shall be performed by a CGC trained technician. A commissioning report shall be provided by the commissioning technician for review and approval by the owner's representative.

1.9 VariPak Make Up Air Unit(s) are 100% fresh air ventilation units that heat the outside air to design conditions in the winter and cool the outside to design conditions during the summer. VariPak units are horizontal floor mounted units that feature the "FreeHeat™" control algorithm and are designed to operate on a single hydronic glycol loop that supports both heating and cooling functions. Features are as follows:

- 100% outdoor air capability.
- Can be installed indoor or outdoor.
- Up to 56 tons and 25,000 CFM.
- **OPTIONAL** Exhaust air heat recovery.
- Eliminates the use for natural gas.
- Reduced electrical consumption – NO compressor operation in heating mode.
- High Energy Efficiency Ratios (EERs)
  - unidirectional refrigerant flow,
  - NO reversing valve,
  - Effective "tube in shell" condenser,
- Low flow rate (2 GPM/ton vs 3) = lower pumping energy.
- Minimized fluid cooler operation.
- Very low sound levels.
- Installation costs LOW.
- Improved comfort.

1.10 Alternate proposals shall include consideration for equipment space requirements, pipe and equipment sizing, electrical installation impact, operation costs, sound implications and redesign fees.

PART 2 Mechanical Parts

2.1 Cabinet

2.1.1 The unit cabinet shall be constructed based on an integral frame and panel design with multiple full height hinged panels arranged for easy service access. All panels shall be double skinned (except for the VPA0).

2.1.2 Major components shall be located out of the air path

so as to avoid interrupting unit operation during routine service.

2.1.3 The cabinet exterior shall be fabricated with 18 gauge satin coat steel and turned up sealed joints. The interior shall be 16 gauge galvanized (VPA0 is only 16 gauge galvanized).

2.1.4 Interior of cabinet is lined with 2" rigid foam insulation, except for 1" neoprene backed acoustic insulation between compressor and fan compartments (VPA0 is only 1" insulation).

2.1.5 The cabinet base shall be structural steel channel frame and structural steel tubing with corner lifting points.

2.1.6 The exterior shell of the cabinet shall be complete with epoxy based powder coat baked enamel finish.

2.2 Blower and Motor

2.2.1 The blower shall be belt drive forward curved, DWDI centrifugal blower(s) operating at a speed not to exceed 85% of critical speed.

2.2.2 The blower bearing shall be of a pillow block type having provisions for lubrication. Extended lube lines shall be provided where nipples are inaccessible. (VPA0 units have non-greasable cassette ball bearings).

2.2.3 The blower shall be statically and dynamically balanced.

2.2.4 The blower motor shall be permanently lubricated.

2.2.5 The belt drive fan shall be sized for minimum 150% of the motor horsepower.

2.2.6 The fan shall have a fixed pitch sheave while the motor sheave shall be adjustable.

2.2.7 The blower motor shall be three phase with thermal overload protection.

2.2.8 The motor shall be easily accessible and removable for service.

2.2.9 The fan motor shall be a premium efficiency totally enclosed fan cooled type.

2.3 Filter

2.3.1 The filter section shall be an integral part of the system, located at the unit intake.

2.3.2 Pre-filters shall be 2" disposable type pleated MERV 8 media filters.

2.3.3 After filters shall be a bag type MERV 13 disposable media filters.

2.3.4 Filters shall be accessible through a hinged access door.

2.4 Hydronic Heating Loop

2.4.1 The refrigerant circuit shall not operate in heating mode.

2.4.2 The circuit shall include a glycol coil with an integral fully modulating three way valve.

2.4.3 The coil, header and control valve shall be integral and completely enclosed within the finished unit cabinet.

2.4.4 Heating coil shall be aluminum fin and copper tube construction rated to withstand 300 PSI working pressure.

PART 3 Refrigeration Parts

3.1 Refrigeration System

3.1.1 The refrigeration circuit shall be available for operation on non-ozone depleting R410a refrigerant.

3.1.2 The refrigeration circuit shall have the following components:

- Thermal Expansion Valve with external equalizer
- Filter dryer
- Refrigerant sight glass
- High & low pressure cut-out
- High & low pressure service port

3.1.3 The service ports shall be located to facilitate field service with unit in place.

3.1.4 All refrigerant piping shall be of type ACR copper pipe.

3.1.5 The refrigerant circuit and components shall be factory assembled in a sealed, leak and performance tested, in a properly charged system.

3.1.6 The sealed refrigerant circuit shall be certified for 600 PSIG working pressure.

3.1.7 Units with plate type heat exchanger must be cleanable with integral filter.

3.2 Compressor

3.2.1 The compressor shall be high efficiency sealed tandem hermetic scroll compressors.

3.2.2 The compressor shall be externally isolated on rubber mounts and connected to refrigerant circuit with floating piping to minimize sound transmission.

3.2.3 The Compressor motor shall have integral thermal overload protection.

3.2.4 The compressor shall not operate in the heating mode.

3.2.5 The Compressor shall be provided with a 5 minute restart delay to avoid compressor short cycling and low pressure lockout.

3.3 Direct Expansion Evaporator Coil

3.3.1 The Refrigerant to air heat exchanger shall be aluminum fin and copper tube construction rated to withstand 300 PSI refrigerant working pressure.

3.3.2 A high corrosion resistant condensate drain pan shall be provided under the coil and fan section (VPA0 units are only under coil).

3.4 Water Cooled Condenser Module

3.4.1 The condenser(s) shall be high efficiency refrigerant-to-water tube in shell design. Tube shall be made of enhanced interior wall copper, minimum 5/8“diameter for clog free operation. Outer shell shall be steel rated to withstand 600 PSI refrigerant working pressure and 450 PSI water pressure.

3.4.2 The fluid connections on 15 Ton or less models shall be female pipe thread extended to be flush with the cabinet exterior. 18 Ton or more models shall be grooved mechanical connections extended outside of the cabinet.

3.4.3 Condensate drain connection shall be 1 1/2” male piped threaded (VPA0 is only 3/4"). Contractor shall supply and install minimum 3” trap and connect to drain.

PART 4 Control System

4.1 System

4.1.1 The unit shall be equipped with a microprocessor-based digital controller. An outside air temperature sensor will be used to switch the unit between heating and cooling modes. Heating is typically activated when the outside air temperature drops below 64°F, and cooling is typically activated when the outside air temperature rises above 70°F. Control algorithms shall be designed to receive a signal from a space temperature sensor (mounted by the contractor) located in the conditioned area. In heating mode this space temperature signal will be fed through a PID module that will control the discharge air temperature using a modulating heating valve. In cooling mode this space temperature signal will be fed through a separate PID module that will control compressor staging.

4.1.2 The controller shall monitor the following:

- Outside air temperature
- Supply air temperature
- Fluid (glycol) leaving temperature
- Space temperature
- High refrigerant pressure
- Low refrigerant pressure

4.1.3 The controller shall control the following:

- Outside air damper (provided by others on indoor units)
- Supply fan (VFD if specified)
- Modulating heating valve
- Compressor operation

4.1.4 Operational safeties:

- Outside air temperature
- Open heating valve 50% during shutdown
- Low temperature shutdown
- Staged start up of all functions
- Anti recycle operation of all components
- High pressure and low pressure refrigerant safeties

4.1.5 The control board shall provide alarm/diagnostic information via an onboard display.

4.1.6 The controller shall be capable of communication via Modbus RTU (RS-485).

4.2 Alarms

4.2.1 The standard Control Panel shall have the following standard alarms:

- Low Coil Temperature
- High Leaving Water Temperature
- Low Discharge Air Temperature
- Low Refrigerant Pressure
- High Refrigerant Pressure
- High Condensate Level (OPTIONAL)

Part 5 Accessories

5.1.1 (OPTIONAL on VPA – Indoor units standard on VPR outdoor units). The intake damper shall be extruded aluminum with shut off sealing parallel blades and complete with spring return actuator.
5.1.2 (OPTIONAL) Variable frequency fan motor drive.

5.1.3 (OPTIONAL) Vertical up discharge.

5.1.4 (OPTIONAL) Refrigerant based exhaust air heat recovery section.

5.1.5 (OPTIONAL) Thermal Wheel Recovery Package.