

## SpaceKeeper Vertical - Model "SKV" Guide Specifications

---

### Part 1: General

---

- 1.1 The HVAC system is based on BULLDOG 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.
- 1.3 Model selection and performance shall be in accordance with the schedule on the drawings.
- 1.4 Mechanical cooling shall be enabled with Entering Condenser Water below 125°F. The system is designed to operate on 2 GPM/ton.
- 1.5 Each unit/chassis shall be pressure tested with Nitrogen on both the refrigerant and fluid (water) circuits followed by a helium leak detection program for both circuits. Units are then attached to the vacuum system for at least one hour and monitored.
- 1.6 Each unit shall be run with a water/ glycol solution to ensure 100% functionality in all modes of operation. Individual units/chassis shall be self-contained and complete when shipped from the factory.
- 1.7 Units shall be safety certified and bear a seal of approval from one of UL/ULC/ETL or ESA. All units must be AHRI certified and meet ASHRAE 90.1 minimum standard.
- 1.8 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.
- 1.9 Commissioning of the BULLDOG 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.
- 1.10 It is the contractor's responsibility to have the system properly flushed and cleaned prior to commissioning.
- 1.11 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 Housing

- 2.1.1 The housing of the unit shall be constructed based on a frame and panel principle with removable panels for maximum service access.
- 2.1.2 Painted exterior panels is available on units sized 008 – 060. Painted exterior panels are standard on units sized 070-320.
- 2.1.3 The unit shall be fabricated with heavy gauge steel with all Interior of cabinet lined with 1/2" acoustic insulation.
- 2.1.4 The supply air opening shall be complete with discharge duct collar.
- 2.1.5 The service panels shall be easily removable and sufficiently large to allow access to all components.

## 2.2 Blower and Motor

- 2.2.1 The complete blower section including motor shall be easily accessible and removable for service.
- 2.2.2 The blower shall be statically and dynamically balanced.
- 2.2.3 The blower shall be directly driven by an EC motor that has an integral thermal overload protection for units up to size 060.
- 2.1.1 The blower shall be belt driven by a three-phase motor with integral thermal overload protection and equipped with a variable frequency drive (VFD) for unit sized 070 - 100. The belt drive blower motor fan speed shall be adjustable by means of the VFD.
- 2.1.2 The fan motor shall be open drip proof on all direct drive types and shall be totally enclosed fan cooled for belt driven types.

## 2.3 Filter

- 2.3.1 The filter chamber shall be an integral part of the system located on return air path and should be serviceable from the front/ rear of the unit.
- 2.3.2 The filter shall be standard capacity, 1 inch thick “Disposable” type shipped with unit sizes 008-060 and 2” standard on sizes 070 and up.
  - \*(Optional) MERV 8 & MERV13 filters.
  - \*(Optional) Ducted Filter Box.

## 2.4 Hydronic Heating Loop

- 2.4.1 The refrigerant circuit shall not operate in the heating mode.
- 2.4.2 Heating coil shall be aluminum fin and copper tube construction rated to withstand 300 PSI working pressure.
  - \*(Optional) The heating coil can be mounted in the reheat position for dehumidification – humidistat by others.
  - \*(Optional) For cooling only units, the heating coil can be omitted.
  - \*(Optional) Electric Element heater added for additional heat capacity. Element heater will be supplied with a self-resetting thermal safety switch and non-resetting thermal safety fuse (or non-resetting bi-metal thermal safety switch).

---

## Part 3: Refrigeration Parts

---

### 3.1 Refrigeration System

- 3.1.1 The refrigeration circuit shall be available for operation on non-ozone depleting R454b refrigerant. Refrigeration circuit does not operate in heating mode.
- 3.1.2 The refrigeration circuit shall have the following components:
  - Thermal Expansion Valve with external equalizer
  - Filter dryer
  - High pressure cut-out
  - High pressure service port
  - Low pressure cut-out
  - Low pressure service port
  - Refrigerant Sight glass (on models 070 and up)
  - \*(Optional) Sight Glass on units up to size 060

- 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, properly charged system.
- 3.1.6 The sealed refrigerant circuit shall be certified for 600 PSIG working condensing pressure.

### 3.2 Compressor

- 3.2.1 The compressor shall be high efficiency sealed hermetic rotary type for sizes 008 – 018 and hermetic scroll type for sizes 020 and above.
  - \*(Optional) sizes 024 – 060 can be ordered with two-stage hermetic scroll compressors.
  - \*(Optional) sizes 070 and up can be ordered with tandem scroll set or dual refrigeration circuits
- 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 470 PSI refrigerant working pressure.
- 3.3.2 The coil shall have a maximum face velocity of 500 FPM.
- 3.3.3 A Stainless-Steel insulated condensate drain pan shall be provided under the coil.
- 3.3.4 The units are shipped with an internally mounted trap supplied by the factory.

### 3.4 Water Cooled Condenser Module

- 3.4.1 The condenser shall be of the brazed plate type that can withstand pressure up to 600 psi. A 20-mesh size strainer will be installed as standard.
- 3.4.2 The connections shall be female pipe thread mounted flush to the cabinet exterior.
  - \*(Optional) Stainless steel braided flexible Supply/ Return 24” hoses are available upon request.

### 3.5 Valve Configuration – Factory Installed

- 3.5.1 All units shall be supplied with two 2-way ON/OFF control valves (1 for heating and 1 for cooling) for variable water flow pumping systems. If the system is bottom fed, all units at the top of each riser shall only be wired for continuous water flow.

---

## Part 4: Control Systems

---

### 4.1 System

- 4.1.1 The unit shall be complete with a standard microprocessor controlled electronic circuit board.
- 4.1.2 The control panel shall be supplied with individual 24 VAC control transformer.
- 4.1.3 The control panel shall have LED indicators displaying thermostat call, unit operation and alarms.
- 4.1.4 Units with R454B refrigerant charge more than 62.5 oz are equipped with refrigerant leak detector sensor and a board that in case of a leak detection it will disconnect the compressor and run the circulation fan.
- 4.1.5 The control board shall operate with:
  - A 24-volt thermostat
  - Onboard fuse protection
- 4.1.6 A remote alarm contact is available for connection to alarm monitor by others – monitored and wired by others.
- 4.1.7 BMS override function available to disable compressor only or disable unit. BMS override and wiring by others.
- 4.1.8 Condensate High Level Monitor and alarm is available.

**\*(Optional)** Different types of BULLDOG thermostats are available upon request.

### 4.2 Alarms

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