

SUGGESTED SPECIFICATION & CONFIGURATION

GENERAL

Furnish and install Krueger vertical floor direct drive fan coil units where indicated on the plans and in the specifications. All units shall be capable of meeting or exceeding the scheduled capacities for cooling, heating and air delivery. Units shall be ETL listed in compliance with UL/ANSI Standard 1995, and be certified as complying with AHRI Standard 440-2008.

CONSTRUCTION

All unit chassis shall be fabricated of heavy gauge galvanized steel panels able to meet 125 hour salt spray test per ASTM B-117. All unit chassis panels shall be insulated with Elastomeric Closed Cell Foam Insulation. Insulation shall conform to UL 181 for erosion and NFPA 90A for fire, smoke and melting, and comply with a 25/50 Flame Spread and Smoke Developed Index per ASTM E-84 or UL 723. Additionally, insulation shall comply with Antimicrobial Performance Rating of 0, no observed growth, per ASTM G-21. Polyethylene or Fiberglass insulation is not acceptable.

All exposed units shall have exterior panels fabricated of not less than 20 gauge galvanized steel [provide a 16 gauge front panel on exposed units]. The front panel shall be attached with quarter turn quick open fasteners to allow for easy removal and access for service. [The front panel shall be attached with tamper proof fasteners. Side panels shall be removable for access to controls and piping within the end pockets].

Top panel shall be removable from fan coil without the need to disconnect piping or electrical wiring (KVFF/KVFS). The top panel shall be removed through not more than 8 screws.

[Provide a grille in the return air opening. (KVFF/KVFS).]
[Provide a decorative return air opening (KVFH).]

All exposed units shall include a recessed stamped louver discharge grille. Louver discharge grille shall be reverse stamped (KVFS only). [Provide an architectural grade linear bar discharge grille with a powder coated paint finish to match cabinet color. Liquid coat paint shall not be acceptable.]

All concealed units shall have a minimum 1" duct collar on the discharge.

PAINTED FINISH

All painted cabinet exterior panels shall be finished with a heat cured anodic acrylic powder paint of the standard factory color. Liquid coat paint shall not be acceptable.

SOUND

Units shall have published sound power level data tested in accordance with AHRI Standard 350.

POWER

Units shall not exceed scheduled power consumption.

FAN & MOTOR

Unit fan shall be dynamically balanced, forward curved, DWDI centrifugal type constructed of galvanized steel for corrosion resistance. Motors shall be high efficiency, permanently lubricated sleeve bearing, permanent split capacitor type with UL and CSA listed automatic reset thermal overload protection and three separate horsepower taps. Shaded pole motors are not acceptable. Single speed motors are not acceptable.

The fan/motor assembly shall be removable and serviceable through the front panel. Each fan/motor assembly shall be fastened by no more than 2 screws. The fan/motor assembly shall be no longer than 44", and shall be easily removable by a single service technician. The motors shall have quick connectors to allow service and removal without the need for tools.

DRAIN PAN

Primary condensate drain pans shall be single wall, heavy gauge galvanized steel for corrosion resistance, and extend under the entire coil section. Drain pans shall be of one piece construction and be positively sloped for condensate removal. Drain pan access that requires removal of coils is not acceptable.

The primary drain pan shall be externally insulated with a fire retardant, elastomeric closed cell foam insulation. The insulation shall carry no more than a 25/50 Flame Spread and Smoke Developed Rating per ASTM E-84 and UL 723 and an Antimicrobial Performance Rating of 0, no observed growth, per ASTM G-21. Double wall non-corrosive auxiliary drain pan is used for condensate from primary drain pan and optional valve packages.

Option: Provide a primary drain pan constructed entirely of heavy gauge stainless steel for superior corrosion resistance.

COILS

All cooling and heating coils shall optimize rows to meet the specified capacity. Coils shall have seamless copper tubes and shall be mechanically expanded to provide an efficient, permanent bond between the tube and fin. Minimum copper tube thickness shall be .016" [.025"].

Fins shall have high efficiency aluminum [copper] surface optimized for heat transfer, air pressure drop and carryover. Lanced fins shall not be acceptable.

All coils shall be tested at 325 PSIG air pressure under water, and rated for a maximum 300 PSIG working pressure at 200°F. Coils shall be circuited for counter flow to maximize unit efficiency.

SUGGESTED SPECIFICATION & CONFIGURATION (CONTINUED)

All water coils shall be designed to connect with ½" nominal pipe connections.

Coils shall be fabricated from galvanized steel [stainless steel].

Heating coils shall be furnished in the pre-heat or re-heat position.

Direct expansion cooling coils shall be factory sealed and charged with minimum 25 PSIG nitrogen or refrigerated dry air.

All water coils shall be provided with a manual air vent fitting to allow for coil venting.

FILTERS

All units shall be furnished with a minimum 1" nominal glass fiber throwaway (1" pleated MERV 8) (1" pleated MERV 13) filter. Filters shall be tight fitting to prevent air bypass. Filters shall be easily removable from the return air opening without the need for tools.

ELECTRICAL

Units shall be furnished with single point power connection. Provide an electrical junction box for motor and other electrical terminations.

Option: Provide 24 VAC fan relay board with 25 VA transformer. Fan relay board designed to operate in conjunction with factory provided (field provided) 24V thermostat. Fan relay board designed to accept 115, 208, 220, 230, or 277 V input power. Fan relay board to be factory installed.

Relay board shall operate with generic thermostat designed to control up to three independently energized fan speeds.

ELECTRIC HEAT

Furnish an electric resistance heating assembly as an integral part of the fan coil unit, with the heating capacity, voltage and kilowatts scheduled. The heater assembly shall be rated for installation on the fan coil unit and be located so as not to expose the fan assembly to excessive leaving air temperatures that could affect motor performance.

The heater and unit assembly shall be listed for zero clearance and meet all NEC requirements, and be ETL listed with the unit as an assembly in compliance with UL/ANSI Standard 1995.

All heating elements on floor mounted units shall be finned tubular type. Elements shall be constructed of nickel chromium resistance wire centered in tubes and embedded in refractory material. Terminals shall be sealed with silicone rubber to protect against moisture. Terminals and hardware shall be stainless steel for corrosion resistance. All internal wiring shall be rated for 105°C minimum.

All heaters shall include over temperature protection consisting of an automatic reset primary thermal limit and back-up secondary thermal limit. All heaters shall be single stage.

Option: Devices used to energize and de-energize (switch) electric heat must be totally silent. Magnetic, mercury, and/or quiet relays and/or contactors are not acceptable.

PIPING PACKAGES

Provide a standard factory assembled valve piping package to consist of a 2-way or 3-way, on/off, motorized electric control valve and two ball isolation valves.

Control valves shall be piped normally closed to the coil. Control valves shall be wired to relay board through quick connects to allow service and replacement of valves. Quick connects shall prevent incorrect wiring through physical and color coded visual confirmation. Maximum entering water temperature on the control valve shall be 200°F, and maximum operating pressure shall be 300 PSIG.

Unions shall be provided to allow removal of piping package from unit without the need for brazing or cutting pipe.

Option: Provide 3-wire floating point modulating control valve (fail-in-place), in lieu of standard 2-position control valve with factory assembled valve piping package.

Option: Provide high pressure close-off actuator for 2-way on/off control valve. Maximum close-off pressure is 50 PSIG (1/2"), 25 PSIG (3/4"), or 20 PSIG (1").

Option: Provide either a fixed or adjustable flow control device for each piping package.

Option: Provide pressure-temperature ports (P/T) for each piping package to allow measurement across the coil.

Piping packages shall be completely factory assembled, including interconnecting pipe and shipped loose for field installation.

Option: Piping package will be shipped factory installed.

OUTSIDE AIR DAMPER

Provide a manual or 2-position motorized outside air damper integral to the unit.

Option: Provide aluminum outside air wall box with integral insect screen and weep holes for field installation.

SUGGESTED SPECIFICATION & CONFIGURATION (CONTINUED)

1. **SERIES: (XXX)**
 KVFF - Vertical Fan Coil, Flat Top
 KVFH - Vertical Fan Coil, Concealed Floor
 KVFS - Vertical Fan Coil, Slant Top
2. **SIZE: (XX)**
 02, 03, 04, 06, 08, 10, 12
3. **MOTOR: (X)**
 A - 115/1/60 - PSC
 B - 208/1/60 - PSC
 C - 230/1/60 - PSC
 E - 277/1/60 - PSC
 F - 115/1/60 - ECM
 G - 208/1/60 - ECM
 H - 230/1/60 - ECM
 K - 277/1/60 - ECM
 L - 220/1/50 - ECM
4. **MOTOR CONTROL: (X)**
 0 - None
 A - 3-Speed Adjustable
 B - 2-10 VDC
 C - 3-Speed Fixed
5. **COIL 1: (X)**
 A - 2-Row Cold Water
 B - 3-Row Cold Water
 C - 4-Row Cold Water
 D - 2-Row DX
 E - 3-Row DX
 F - 4-Row DX
 G - 1-Row Hot Water, Same End Connection
 H - 2-Row Hot Water, Same End Connection
 L - 1-Row Hot Water
 M - 2-Row Hot Water
 P - 2-Row with Changeover
 R - 3-Row with Changeover
 S - 4-Row with Changeover
6. **COIL 1 FPI: (X)**
 10 - 10 FPI
7. **COIL 1 TUBE WALL: (X)**
 1 - 0.016" Tube Wall Thickness
8. **COIL 1 HAND: (X)**
 L - Left-Hand
 R - Right-Hand
9. **COIL 1 AIR VENT: (X)**
 1 - Manual Air Vent
 2 - Auto Air Vent
10. **COIL 1 REFRIGERANT TYPE: (X)**
 4 - R-410
11. **COIL 1 DISTRIBUTOR: (XXX)**
 (See Krueger's selection software.)
12. **COIL 1 PIPING SIZE: (X)**
 H - 1/2"
13. **COIL 1 PIPING PACKAGE: (XX)**
 0 - None
 A - 2-Way Control Valve
 B - 3-Way Control Valve
14. **COIL 1 BALANCING VALVE: (XX)**
 0 - None
 M - Manual Balancing Valve for 3-Way
15. **COIL 1 FLOW CONTROL: (XX)**
 00 - Provided by Others 1/2" Valve Package
 24 - MBV with MS
 25 - MBV with MS, Fixed Flow Control
 29 - MBV with MS, Adjustable Flow Circuit Setter
 36 - MBV with MS
 37 - MBV with MS, Fixed Flow Control
 41 - MBV with MS, Adjustable Flow Circuit Setter
16. **COIL 1 FIXED GPM: (X)**
 (See Krueger's selection software.)
17. **COIL 1 Y-STRAINER: (XX)**
 0 - None
 Y - Y-Strainer with Blowdown
18. **COIL 1 UNIONS: (X)**
 0 - None
 U - Union
19. **COIL 1 P/T PORTS: (X)**
 0 - None
 P - P/T Port
20. **COIL 1 AQUASTAT BLEED LINE: (X)**
 0 - None
 A - Aquastat Bleed Line
21. **COIL 1 ACTUATOR TYPE: (X)**
 0 - None
 1 - Factory Provided 2-Position Close-Off, NC
 2 - MV, 2-Way, Floating Point, Fail-In-Place, 24V
 3 - MV, 3-Way, Floating Point, Fail-In-Place, 24V
 4 - HP Close-Off Actuator, 2-Way Valve-24V
 Note: MV = Modulating Valves, HP = High Pressure
22. **COIL 1 PIPING FACTORY MOUNT: (X)**
 0 - None (Shipped Loose)
 M - Piping Package Mounted at Factory

SUGGESTED SPECIFICATION & CONFIGURATION (CONTINUED)
23. ELECTRIC HEAT VOLTAGE: (X)

- 0 - None
- A - 115 Volt, 1-Phase, 1-Stage
- D - 208 Volt, 1-Phase, 1-Stage
- G - 230 Volt, 1-Phase, 1-Stage
- K - 277 Volt, 1-Phase, 1-Stage

24. kW: (XX)

(See Krueger's selection software.)

25. SILENT RELAY: (X)

- 0 - None
- S - Silent Relay

26. MANUAL RESET: (X)

- 0 - None
- M - Manual Reset

27. COIL 2 SELECTIONS

(See Coil 1 options. Differences may apply.)

28. COIL CASING: (X)

- 1 - Galvanized Coil Casing
- 2 - Stainless Steel Coil Casing

29. FILTER: (X)

- 0 - 1" Throwaway Filter
- E - 1" MERV 8 Filter
- T - 1" MERV 13 Filter

30. SPARE FILTER: (X)

(See Krueger's selection software.)

31. 16 GAUGE FRONT PANEL: (X) (KVFF/KVFS Only)

- Y - Unit with 16 Gauge Front Panel
- N - Unit without 16 Gauge Front Panel

32. LEVELING LEGS: (X)

- 0 - None
- L - Leveling Legs

**33. ADDITIONAL HEIGHT AND WIDTH: (X)
(KVFF/KVFS Only)**

(See Krueger's selection software.)

34. EXTENDED END POCKET: (X) (KVFF/KVFS Only)

- 00 - None
- RE - Right-Hand Extended End Pocket
- LE - Left-Hand Extended End Pocket

35. FALSEBACK: (X) (KVFF/KVFS Only)

- 0 - None
- 2 - 2" Falseback
- 4 - 4" Falseback
- 6 - 6" Falseback
- 8 - 8" Falseback

**36. TAMPER PROOF FASTENERS: (X)
(KVFF/KVFS Only)**

- 0 - None
- T - Tamper Proof Fasteners

37. UNIT DRAIN PAN: (X)

- 0 - Galvanized Drain Pan
- S - Stainless Steel Unit Drain Pan

38. AUXILIARY DRIP PAN: (X)

- 0 - Plastic, Double Wall
- 1 - Plastic (For Units with End Pocket)
(KVFF/KVFS Only)
- 2 - Stainless Steel, for units with End Pocket
(KVFF/KVFS Only)

39. BASIC CONTROL PACKAGE: (X)

- 0 - Line Voltage with Electric Heat (EH)
- 1 - Line Voltage
- 2 - 24V, Unit S/S Relay, Fan Op. Relay, Trans.
- 3 - 24V, Unit S/S Relay, Fan Op. Relay, Trans. with EH

40. THERMOSTAT LOCATION: (X)

- R - Remote Mounted T-Stat
- U - Unit Mounted T-Stat (KVFF/KVFS Only)
- 0 - None

41. THERMOSTAT: (XXXX)
N or F Series: BACnet or Standalone

- N03H - 2P, HO, N, ON/OFF, HML, N
- N03C - 2P, CO, N, ON/OFF, HML, N
- 0N05 - 2P, H/C, A, ON/OFF, HML, Y
- 0N07 - 2P, H/C w/AUX H, A, ON/OFF, HML, Y
- 0N08 - 2P, C w/EH, A, ON/OFF, HML, N
- 0N11 - 4P, H/C, A, ON/OFF, HML, N
- F03H - 2P, HO, N, ON/OFF, HML, N
- F03C - 2P, CO, N, ON/OFF, HML, N
- 0F05 - 2P, H/C, A, ON/OFF, HML, Y
- 0F07 - 2P, H/C w/AUX H, A, ON/OFF, HML, Y
- 0F08 - 2P, C w/EH, A, ON/OFF, HML, N
- 0F11 - 4P, H/C, A, ON/OFF, HML, N

P- Series: 7-Day Programmable

- P03H - 2P, HO, N, H/OFF, AHMLO, N
- P03C - 2P, CO, N, C/OFF, AHMLO, N
- 0P05 - 2P, H/C, A, H/OFF/C/A, AHMLO, Y
- 0P06 - 2P, H/C w/AUX H, A, H/OFF/C/A, AHMLO, Y
- 0P08 - 2P, C w/EH, A, H/OFF/C/A, AHMLO, N
- 0P11 - 4P, H/C, A, H/OFF/C/A, AHMLO, N

D- Series: Digital

- D03H - 2P, HO, N, H/OFF, AHMLO, N
- D03C - 2P, CO, N, C/OFF, AHMLO, N
- 0D05 - 2P, H/C, A, H/OFF/C/A, AHMLO, Y
- 0D06 - 2P, H/C w/AUX H, A, H/OFF/C/A, AHMLO, Y
- 0D08 - 2P, C w/EH, A, H/OFF/C/A, AHMLO, N
- 0D11 - 4P, H/C, A, H/OFF/C/A, AHMLO, N

(See Krueger's website for more information.)

SUGGESTED SPECIFICATION & CONFIGURATION (CONTINUED)

42. AQUASTAT: (X)

- 0 - None
- A - Aquastat

43. FAN SPEED CONTROLLER: (X)

- 0 - None
- F - SCR Fan Speed Controller

44. DISCONNECT SWITCH: (X)

- 0 - None
- L - Door Interlocking non-Fused Disconnect
- T - Toggle Disconnect Switch

45. MAIN FUSING: (X)

- 0 - None
- M - Main Fusing

46. FLOAT SWITCH: (X)

- 0 - None
- D - Drain Pan Float Switch

47. SPEED SWITCH: (X)

- 0 - None
- U - Unit Mount 3-Speed Switch with Off Position
- R - Remote Mount 3-Speed Switch with Off Position

48. RETURN AIR: (X)

- 0 - Open Toe Space
- S - Stamped Louver Toe Kick Grille (KVFF/KVFS Only)

49. SUPPLY AIR: (X)

- C - Duct Collar (KVFH Only)
- S - Stamped Louver Grille
- L - Aluminum Linear Bar Grille

50. OUTSIDE AIR: (X)

- 0 - None
- 1 - Manual Outside Air Damper
- 2 - Motorized Outside Air Damper

51. WALL BOX: (X)

- 0 - None
- W - Wall Box

52. PAINT: (X)

- 0 - Pearl White Satin
- 1 - British White

53. WALL RECESSING PANEL: (X) (KVFH Only)

- 0 - None
- 1 - Stamped Return, STD Length
- 2 - Stamped Return, EXT Length - Left
- 3 - Stamped Return, EXT Length - Right
- 4 - Stamped Return and Supply, STD Length
- 5 - Stamped Return and Supply, STD Length - Left
- 6 - Stamped Return and Supply, STD Length - Right

54. FM DDC MANUFACTURER: (X)

- 0 - None
- 6 - Johnson Controls

55. FM DDC MODEL: (XX)

- 00 - None
- 01 - FEC 1610

56. FM CONTROL ENCLOSURE: (XX)

- 0 - None
- 1 - Control Enclosure