KHF Series Engineering Specification & Configuration

GENERAL
Furnish and install Krueger KHF horizontal concealed direct drive fan coil units where indicated on the plans and in the specifications. Units shall be completely factory assembled, tested and shipped as one piece. All units shall be capable of meeting or exceeding the scheduled capacities for cooling, heating and air delivery. All unit dimensions for each model and size shall be considered maximums. Units shall be ETL listed in compliance with UL/ANSI Standard 1995, and be certified as complying with the latest edition of AHRI Standard 440.

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 exterior panels shall be insulated with 1/2" thick insulation with a maximum k value of .24 (BTU • in) / (hr • ft^2 • °F) and rated for a maximum air velocity of 5000 f.p.m. Insulation must meet all requirements of ASTM C1071 (including C665), UL 181 for erosion, and carry a 25/50 rating for flame spread/ smoke developed per ASTM E-84, UL 723 and NFPA 90A.

All concealed units shall have a minimum 1-1/2" duct collar on the discharge. Plenum and exposed units shall have a minimum 3/4" duct collar on the return. All exposed units shall have exterior panels fabricated of galvannealed steel. The fan and filter bottom access panel shall be attached with quarter turn quick open fasteners to allow for easy removal and access for service.

Option: Provide foil faced insulation in lieu of standard. Foil insulation shall meet or exceed the requirements stated above, and in addition meet ASTM Standards C-665 and C-1136 for biological growth in insulation. Insulation shall be lined with aluminum foil, fiberglass scrim reinforcement, and 30 pound kraft paper laminated together with a flame resistant adhesive. All exposed edges shall be sealed to prevent any fibers from reaching the air stream.

Option: Provide Elastomeric Closed Cell Foam Insulation in lieu of standard. 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 insulation is not acceptable.

Unit mounting shall be by hanger brackets provided at four locations. Hanger brackets shall include rubber grommet isolators with brass eyelets for threaded rod.

PAINTED FINISH
All painted cabinet exterior panels shall be finished with a heat cured anodic acrylic powder paint of the standard factory color.

SOUND
Units shall have published sound power level data tested in accordance with AHRI Standard 350-2000 (nonducted equipment) and AHRI Standard 260-2001 (ducted equipment).

FAN ASSEMBLY
Unit fan shall be a dynamically balanced, forwardly curved, DWDI centrifugal type constructed of 18 gauge zinc coated 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. Single speed motors are not acceptable.

The fan assembly shall be easily removable for servicing the motor and blower at, or away from the unit. The entire fan assembly shall be able to come out of the unit by removing two screws and unplugging the motor. Plenum unit fan assemblies shall be easily serviced through an access panel provided.

Option: Provide an electronic (SCR) fan speed controller as an aid in balancing the fan capacity. The speed controller shall have a turn down stop to prevent the possibility of harming the motor bearings, and incorporate electrical noise suppression to minimize noise on the incoming power lines.

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

COILS
All cooling and heating coils shall optimize rows and fins per inch 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. Fins shall have high efficiency aluminum surface optimized for heat transfer, air pressure drop and carryover.

All coils shall be hydrostatically tested at 450 PSIG air pressure under water, and rated for a maximum of 300 PSIG working pressure at 200°F.

Direct expansion cooling coils shall include a fixed orifice metering device. All evaporator coils shall be factory sealed and charged with a minimum 5 PSIG nitrogen or refrigerated dry air.

Option: Coil casing shall be fabricated from Stainless Steel. All coils shall be provided with a manual air vent fitting to allow for coil venting.

Option: Provide automatic air vents in lieu of manual air vents.

Heating coils shall be furnished in the reheat or preheat position on units with chilled water coils, or in the reheat position for DX coils.

DRAIN PANS
Primary condensate drain pans shall be single wall, heavy gauge galvanized steel for corrosion resistance, and extend under the entire cooling coil. Drain pans shall be of one-piece construction and be positively sloped for condensate removal. Drain pans on concealed models shall be field reversible for right or left hand connections.

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The drain pan shall be externally insulated with a fire retardant, 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.

Option: Provide a single wall primary drain pan constructed entirely of heavy gauge stainless steel for superior corrosion resistance. Stainless steel drain pans shall be externally insulated and meet or exceed the requirements stated above.

Option: Provide a secondary drain connection on the primary drain pan for condensate overflow.

FILTERS

All plenum and exposed units shall be furnished with a minimum 1" nominal glass fiber throwaway filter. Filters shall be tight fitting to prevent air bypass. Plenum unit filters shall be easily removable from the bottom of the unit without the need for tools.

Option: Provide unit with 1" pleated filter (MERV 8).

ELECTRICAL

Units shall be furnished with single point power connection. Provide an electrical junction box with terminal strip for motor and other electrical terminations. The factory mounted terminal wiring strip consists of a multiple position screw terminal block to facilitate wiring terminations for the electric control valves and thermostats.

Option: Provide a hinged electrical enclosure in the bottom of the unit for easy access to all electrical components, terminal blocks and wiring.

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 designed and rated for installation on the fan coil unit without the use of duct extensions or transitions, and be located in the unit as to not 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 shall be open coil type nichrome wire mounted in ceramic insulators and located in an insulated heavy gauge galvanized steel housing. All elements shall terminate in a machine staked stainless steel terminal secured with stainless steel hardware for corrosion resistance. The element support brackets shall be spaced no greater than 3-1/2" on center. 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: Provide a manual reset secondary thermal limit.

All units with electric heat shall have a bottom hinged electrical enclosure for easy access and service to the electrical components and wiring. An incoming line power distribution block shall be provided and designated to accept single point power wiring capable of carrying 125% of the calculated load current.

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 or 3 way, on/off, motorized electric control valve and two ball isolation valves. Control valves are piped normally closed to the coil. Maximum entering water temperature on the control valve is 200°F, and maximum close-off pressure is 40 PSIG (1/2") or 20 PSIG (3/4"). Maximum operating pressure shall be 300 PSIG.

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 actuators for 2-way on/off control valves. Maximum close-off pressure is 50 PSIG (1/2") or 25 PSIG (3/4").

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

Option: Provide pressure-temperature ports for each piping package.

Piping package shall be completely factory assembled, including interconnecting pipe, and shipped separate from the unit for field installation on the coil, so as to minimize the risk of freight damage.

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1. SERIES: (XXXX)
KHFE - Horizontal Fan Coil, Exposed Cabinet
KHFH - Horizontal Fan Coil, Concealed Ceiling
KHFP - Horizontal Fan Coil, Concealed with Plenum

2. SIZE: (XX)
20, 25, 30, 40, 50, 60

3. MOTOR: (X)
(*See Krueger's selection software.*)

4. MOTOR CONTROL: (X) (KHFE/KHFP Only)
0 - None
A - A - 3 Speed Adjustable
B - B - 2-10 VDC

5. COIL 1: (X)
A - 3 Row Cold Water
B - 4 Row Cold Water
C - 5 Row Cold Water
D - 3 Row DX
E - 4 Row DX
F - 1 Row Hot Water
G - 2 Row Hot Water
H - 3 Row with Changeover
J - 4 Row with Changeover
K - 5 Row with Changeover

6. COIL 1 DIAMETER: (XX)
38 - 3/8" Tube Diameter
12 - 1/2" Tube Diameter

7. COIL 1 FPI: (XX)
10 - 10 FPI

8. COIL 1 TUBE WALL: (X)
1 - 0.016" Tube Wall Thickness
3 - 0.012" Tube Wall Thickness

9. COIL 1 HAND: (X)
L - Left Hand
R - Right Hand

10. COIL 1 AIR VENT: (X)
1 - Manual Air Vent
2 - Auto Air Vent

11. COIL 1 CASING: (X)
1 - Galvanized Coil Casing
2 - Stainless Steel Coil Casing

12. COIL 1 REFRIGERANT TYPE: (X) (KHFE/KHFH Only)
4 - R-410
2 - R-22

13. COIL 1 DISTRIBUTOR: (XXX)
(*See Krueger's selection software.*)

14. COIL 1 PIPING SIZE: (X)
H - 1/2"
T - 3/4"

15. COIL 1 PIPING VALVE: (X)
0 - None
A - 2-Way Control Valve
B - 3-Way Control Valve
C - 3-Way with Balance ByPass Valve

16. COIL 1 PIPING PACKAGE: (XX)
(*See Krueger's selection software.*)

17. COIL 1 FIXED GPM: (X)
(*See Krueger's selection software.*)

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 - Field Provided by Others 2-Position Close-Off
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-24/115/208V
5 - HP Close-Off Actuator, 2-Way Valve-230/277V
Note: MV = Modulating Valves, HP = High Pressure

22. 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
H - 220 Volt, 1 Phase, 1 Stage
K - 277 Volt, 1 Phase, 1 Stage

23. kW: (XX)
(*See Krueger's selection software.*)

24. SILENT RELAY: (X)
0 - None
S - Silent Relay

25. MANUAL RESET: (X)
0 - None
M - Manual Reset

26. COIL 2 SELECTIONS
(*See Coil 1 options. Differences may apply.*)

Continued on next page...

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27. BOTTOM RETURN DUCT CONNECTION: (X) (KHFP Only)
0 - None
D - Bottom Return Duct Connection

28. BOTTOM HINGE ELECTRIC ENCLOSURE: (X)
0 - None
B - Bottom Hinged Electrical Enclosure

29. FILTER: (X) (KHFE/KHFP Only)
0 - 1" Throwaway Filter
P - 1" Pleated Filter MERV 8

30. SPARE FILTER: (X) (KHFE/KHFP Only)
(*See Krueger's selection software.*)

31. ACCESS PANEL: (X) (KHFH/KHFP Only)
0 - None
C - Ceiling Access RAP - British White (KHFP Only)
S - Solid Ceiling Access Panel - British White
T - Ceiling Access RAP with Telescoping Duct - British White (KHFP Only)

32. ACCESS PANEL SIZE: (XX) (KHFH/KHFP Only)
(*See Krueger's selection software.*)

33. INSULATION: (X)
F - Foil Faced Insulation
C - Elastomeric Closed Cell Foam Insulation

34. UNIT DRAIN PAN: (X)
0 - Galvanized Drain Pan
S - Stainless Steel Unit Drain Pan

35. SECONDARY DRAIN CONNECT: (X)
0 - None
C - Secondary Drain Connection

36. AUXILIARY DRIP PAN: (X)
0 - None
G - Galvanized Auxiliary Drip Pan
S - Stainless Steel Auxiliary Drip Pan

37. 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

38. FAN SPEED CONTROLLER: (X)
0 - None
F - SCR Fan Speed Controller

39. DISCONNECT SWITCH: (X)
0 - None
L - Door Interlocking non-Fused Disconnect
T - Toggle Disconnect Switch

40. MAIN FUSING: (X)
0 - None
M - Main Fusing

41. FLOAT SWITCH: (X)
0 - None
D - Drain Pan Float Switch

42. SPEED SWITCH: (X)
0 - None
U - Unit Mount 3-Speed Switch with Off Position
R - Remote Mount 3-Speed Switch with Off Position

43. SOLID STATE RELAY: (X)
0 - None
1 - SSR (1) in Lieu of Start/Stop Relay
2 - SSRs (2) for (High, Low) Fan Control
3 - SSRs (3) for (High, Medium, Low) Fan Control

44. RETURN AIR: (X) (KHFE Only)
0 - Bottom Stamped Louver Grille
1 - Rear Stamped Louver Grille
2 - Rear Duct Collar

45. SUPPLY AIR: (X) (KHFE Only)
0 - Stamped Louver Grille
1 - Aluminum Double Deflection Grille
2 - Front Duct Collar

46. PAINT: (X) (KHFE Only)
0 - Pearl White Satin
1 - British White

47. THERMOSTAT: (XXXX)
(*See Krueger's selection software.*)

48. AQUASTAT: (X)
0 - None
A - Aquastat

49. FACTORY MOUNTED DDC MANUFACTURER: (X)
(*See Krueger's selection software.*)

50. FACTORY MOUNTED DDC MODEL: (XX)
(*See Krueger's selection software.*)