

SUGGESTED SPECIFICATION & CONFIGURATION

GENERAL

Furnish and install Krueger® Model KBHD & KBVD Blower Coil Units where indicated on the plans and specifications. Units shall be completely factory assembled and tested and shipped as one piece except where noted.

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.

All units shall be of "draw-thru" design with coils, fans, motor, and drain pan completely contained within the unit cabinet.

Electric heat to be in the blow-thru configuration.

Units shall be cETL listed in compliance with UL/ANSI Std. 1995.

All unit coils shall meet or exceed the scheduled cooling and heating capacity, selected and rated in accordance with AHRI 410.

CONSTRUCTION

All units shall be fabricated of minimum 18 gage galvanized steel, able to withstand a 125 hour salt spray test per ASTM B-117. Panels shall be die-formed "multibend" construction for optimum strength and rigidity.

All exterior panels shall be single wall insulated with 1" thick fiberglass insulation, rated for a maximum air velocity of 5000 f.p.m.

Optional: Single wall with 1" thick, 1.6 pound per cubic foot density scrim reinforced foil faced insulation.

Optional: Single wall with 1" thick closed cell foam insulation.

Insulation must meet all requirements of ASTM C1071 (including C665), UL181 for erosion, and carry a 25/50 rating for flame spread/smoke developed per ASTM E-84, UL723 and NFPA 90A. In addition to using adhesive complying with NFPA 90A, the insulation shall incorporate a secondary mechanical fastener attached to the unit casing wall. Adhesive as the only method of fastening the insulation to the casing is not acceptable.

All access panels shall be fully insulated and attached with standard fasteners on at least two opposite sides. No single access panel shall be larger than 30" x 36" for safety and ease of handling. No coil or drain piping or electrical connections shall pass through any access panel. Each unit shall be furnished with a one-piece heavy gage.

G90 steel or optional IAQ stainless steel drain pan with welded corner construction. Drain pan shall be insulated with minimum 1/8" closed cell foam. All units shall be

provided with 9/16" diameter hanger rod holes in the top and bottom panels for "through-bolt" type suspension installation.

Optional: Spring type unit mounting vibration isolators shall be provided by the unit manufacturer.

Optional: Rubber-in-shear type unit mounting vibration isolators shall be provided by the unit manufacturer.

Optional: Units to have factory assembled and installed base rails with rigging slots.

All units shall have a minimum 1" duct collar on both the discharge and return.

FAN & MOTOR ASSEMBLY

All units shall be furnished with double inlet forward curved centrifugal blowers statically and dynamically balanced for smooth operation. Blower wheels shall be mounted directly on the motor shaft. Belt driven blowers are not acceptable.

Fan motors shall be electronically commutated with thermal overload protection and a constant torque operation. RPM control shall not be acceptable. Motors shall feature permanently lubricated ball bearings and operate on three or single phase power.

All motors to be installed, factory programmed and wired to the control panel.

All motors shall be isolated, depending on motor size, via belly band or torsion flex mount to the blower housing.

All motor wiring is to be terminated in a junction box, external to the unit casing.

All motors to be operated by single-speed or multi-speed local or remote controller.

COILS

All unit coils shall be rated in accordance with AHRI 410.

All coils shall be 1/2" O.D. seamless copper tubes with collared aluminum fins. All tubes shall be mechanically expanded to provide an efficient bond between tube and fin. All water coils shall be provided with a manual air vent fitting to allow for coil venting. Valve core type vent fittings shall not be accepted.

All chilled water, hot water, and direct expansion (DX) coils shall have aluminum fins and 0.016" tube wall thickness.

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

All steam coils shall have 0.025" tube wall thickness.

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All steam coils shall be suitable for 15 PSIG maximum operating pressure.

Optional: Provide automatic air vents, in lieu of manual air vents.

Optional: Provide 0.025" tube wall thickness.

FILTER RACK ASSEMBLY

All units shall be furnished with a flat filter rack with hinged access on both sides designed to accept a 2" nominal standard sized filters. All units shall be provided with nominal 2" throwaway filters factory installed. One complete set of spare throwaway filters shall be provided for each unit.

Optional: Factory provided MERV 8 pleated filters.

Optional: Unit shall have a High Efficiency filter rack suitable for a pleated 2" MERV 8 and a pleated 4" MERV 11, MERV 14 or MERV 15 filter.

INLET DAMPER SECTION

Where shown on the plans, the unit manufacturer shall furnish a fully insulated mixing box section (factory assembled and installed inlet damper section) to be mounted next to the unit on base rail (unit & mixing box).

The mixing box section shall include heavy gage formed steel blade dampers in a heavy gage steel frame with extruded vinyl blade seals and flexible metal jamb seals. Damper drive linkage shall be factory furnished and installed by the unit manufacturer. A field furnished and installed damper actuator can be mounted directly to the damper shaft.

ELECTRICAL CONTROL

The unit fan motor shall be completely factory wired to an external electrical enclosure. Each unit shall include fan control package with 24 volt control voltage. Each unit shall include a motor control board, motor circuit fusing, control circuit transformer and terminal strip for connection of field wiring.

Motor Control Board Option 1: Motor control shall be provided by a single speed or proportional speed controller mounted on the exterior surface of the control box.

Opening the control box to adjust the fan speed shall not be required.

Motor Control Board Option 2: Four speed motor control shall be provided with potentiometer type adjustment. Unit to be compatible with three speed control thermostat.

Calibrated airflow curves shall be provided near the control box to aid in testing and balancing.

A main incoming power non-fused disconnect switch with lock-out tag-out ready feature shall be factory furnished and wired by the unit manufacturer for single point power connection.

ELECTRIC HEAT SECTION

Where shown on the plans, the unit manufacturer shall furnish an electric resistance heating assembly with the heating capacity, voltage and stages as shown in the schedule. The heater assembly shall be designed and rated for installation to the blower coil unit in the blow thru configuration without the use of duct extensions or transitions between the unit and the heater assembly. The heater assembly shall be factory assembled to the air handling unit and completely factory wired. The heater/unit assembly shall be listed for zero clearance meeting all N.E.C. requirements and be cETL listed in compliance with UL/ANSI Std. 1995.

All heating elements shall be open coil design using Ni-Chrome wire mounted in ceramic insulators and housed in an insulated heavy gage galvanized steel housing. All elements shall terminate in a machine staked stainless steel terminal secured with stainless steel hardware. 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. All heaters shall include a non-adjustable airflow switch.

An incoming line power distribution block shall be provided. The power distribution block shall be designed to accept incoming power wiring capable of carrying 125% of the calculated load current.

In addition to the above, electric heaters shall include the following options:

- Main incoming power disconnect (non-fused)
- Main fusing
- Magnetic contactors wired for disconnecting operation

Electric heat section available uninsulated or with insulated double wall construction.

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- 1. SERIES:**
KBHD- Horizontal Direct Drive Blower Coil
KBVD - Vertical Direct Drive Blower Coil
- 2. ARRANGEMENT:**
Fan Arr. 1 (Upblast Rear)
Fan Arr. 2 (Upblast Front)
Fan Arr. 3 (Horizontal Top Front)
- 3. INLET:**
High Efficiency Rack
Mixing Box with Linkage
- 4. MIXING BOX DAMPER LOCATION:**
Bottom and Rear Inlet
Top and Bottom Inlet
Top and Rear Inlet
- 5. SIZE:**
8, 12, 16, 20, 30, 40
- 6. MOTOR VOLTAGE:**
115/1/60 ECM
208/1/60 ECM
230/1/60 ECM
277/1/60 ECM
208/3/60 ECM
230/3/60 ECM
460/3/60 ECM
- 7. MOTOR CONTROL:**
Solo - Manual Adjustment
Select - 3 Speed Adjustable
Sync - Remote Signal Adj 2-10VDC
- 8. MOTOR HAND:**
Left-hand Motor
Right-hand Motor
- 9. SPEED SWITCH:**
Field Provided
Unit Mounted 3 Speed Switch with Off Position
Remote Mounted 3 Speed Switch with Off Position
- 10. AUTO SWITCH:**
Hand-Off Auto Switch
- 11. CONTROL ENCLOSURE LOCATION:**
Standard - Discharge End/Access Door
 Opens from Discharge End
Alternate 1 - Top of Unit/Access Door Opens to Side
Alternate 2 - Discharge End/Access Door
 Opens to Side
- 12. COIL 1:**
3-Row Cold Water
4-Row Cold Water
6-Row Cold Water
3-Row DX, Single Circuit
4-Row DX, Single Circuit
6-Row DX, Single Circuit
1-Row Hot Water
2-Row Hot Water
1-Row Steam
2-Row Steam
3-Row with Changeover
4-Row with Changeover
6-Row with Changeover
- 13. COIL 1 FPI:**
8 FPI
10 FPI
12 FPI
14 FPI
- 14. COIL 1 HAND:**
Right Hand
Left Hand
- 15. COIL 1 AIR VENT:**
Manual
Auto Air Vent
- 16. COIL 1 CASING:**
Galvanized Casing
Stainless Steel Casing
- 17. COIL 1 TUBE WALL:**
0.016"
0.025"
- 18. COIL 1 REFRIGERANT TYPE: (KHGE/KHGH Only)**
R-410
- 19. COIL 1 DISTRIBUTOR:**
(See Krueger's selection software)
- 20. COIL 1 PIPING SIZE:**
1/2", 3/4", 1", 1-1/4", 1-1/2"
- 21. COIL 1 PIPING VALVE:**
2-Way Control Valve
3-Way Control Valve
3-Way with Balance Bypass Valve
- 22. COIL 1 PIPING PACKAGE:**
Manual Ball Valve w/ Memory Stop
Manual Ball Valve w/ Memory Stop, Fixed Flow Ctrl
Ball Valve in Bypass & Ball Valves w/ Memory Stop

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23. COIL 1 FIXED GPM:

- 1/2" = 0.5 to 4.0 GPM in 0.5 GPM increments
- > 4.0 to 9.0 GPM in 1.0 GPM increments
- 3/4" = 4.0 to 15.0 GPM in 1.0 GPM increments
- 1" = 11.0 to 22.0 GPM in 1.0 GPM increments
- 1-1/4" = 18.0 to 29.0 GPM in 1.0 GPM increments
- 1-1/2" = 26.0 to 45.0 GPM in 1.0 GPM increments

24. COIL 1 UNIONS:

- Union

25. COIL 1 P/T PORTS:

- P/T Port

26. COIL 1 AQUASTAT BLEED LINE:

- Aquastat Bleed Line

27. COIL 1 Y-STRAINER:

- Y-Strainer
- Y-Strainer with blowdown

28. COIL 1 ACTUATOR TYPE:

- Field Provided by Others 2-Position Close-Off
- Factory Provided 2-Position Close-Off, NC
- MV, 2-Way, Floating Point, Fail-In-Place, 24V
- MV, 3-Way, Floating Point, Fail-In-Place, 24V
- HP Close-Off Actuator, 2-Way Valve-24/115/208V
- HP Close-Off Actuator, 2-Way Valve-230/277V

29. COIL 1 ACTUATOR POSITION:

- Normally Closed - 2-Pos Close Off
- Normally Open - 2-Pos Close Off
- Normally Closed - Modulating
- Normally Open - Modulating
- Fail in Place - Modulating
- Normally Closed - Proportional
- Normally Open - Proportional
- Fail in Place - Proportional

30. COIL 2:

- 3-Row Cold Water
- 4-Row Cold Water
- 6-Row Cold Water
- 3-Row DX, Single Circuit
- 4-Row DX, Single Circuit
- 6-Row DX, Single Circuit
- 1-Row Hot Water
- 2-Row Hot Water
- 1-Row Steam
- 2-Row Steam

31. COIL 2 FPI:

- 8 FPI
- 10 FPI
- 12 FPI
- 14 FPI

32. COIL 2 AUTO AIR VENT:

- Manual
- Auto Air Vent

33. COIL 2 CASING:

- Galvanized Casing
- Stainless Steel Casing

34. COIL 2 TUBE WALL:

- 0.016"
- 0.025"

35. COIL 2 REFRIGERANT TYPE: (KHGE/KHGH Only)

- R-410

36. COIL 2 DISTRIBUTOR:

- (See Krueger's selection software)

37. COIL 2 PIPING SIZE:

- 1/2", 3/4", 1", 1-1/4", 1-1/2"

38. COIL 2 PIPING VALVE:

- 2-Way Control Valve
- 3-Way Control Valve
- 3-Way with Balance ByPass Valve

39. COIL 2 PIPING PACKAGE:

- Manual Ball Valve w/ Memory Stop
- Manual Ball Valve w/ Memory Stop, Fixed Flow Ctrl
- Ball Valve in Bypass & Ball Valves w/ Memory Stop

40. COIL 2 FIXED GPM:

- 1/2" = 0.5 to 4.0 GPM in 0.5 GPM increments
- > 4.0 to 9.0 GPM in 1.0 GPM increments
- 3/4" = 4.0 to 15.0 GPM in 1.0 GPM increments
- 1" = 11.0 to 22.0 GPM in 1.0 GPM increments
- 1-1/4" = 18.0 to 29.0 GPM in 1.0 GPM increments
- 1-1/2" = 26.0 to 45.0 GPM in 1.0 GPM increments

41. COIL 2 UNIONS:

- Union

42. COIL 2 P/T PORTS:

- P/T Port

43. COIL 2 AQUASTAT BLEED LINE:

- Aquastat Bleed Line

44. COIL 2 Y-STRAINER:

- Y-Strainer
- Y-Strainer with blowdown

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45. COIL 2 ACTUATOR TYPE:

Field Provided by Others 2-Position Close-Off
Factory Provided 2-Position Close-Off, NC
MV, 2-Way, Floating Point, Fail-In-Place, 24V
MV, 3-Way, Floating Point, Fail-In-Place, 24V
HP Close-Off Actuator, 2-Way Valve-24/115/208V
HP Close-Off Actuator, 2-Way Valve-230/277V

46. COIL 2 ACTUATOR POSITION:

Normally Closed - 2-Pos Close Off
Normally Open - 2-Pos Close Off
Normally Closed - Modulating
Normally Open - Modulating
Fail in Place - Modulating
Normally Closed - Proportional
Normally Open - Proportional
Fail in Place - Proportional

47. ELECTRIC HEAT CASING:

Blow Through Uninsulated
Blow Through Double Wall

48. ELECTRIC HEAT VOLTAGE:

(See Krueger's selection software.)

49. ELECTRIC HEAT KW:

(See Krueger's selection software.)

50. ELECTRIC HEAT HAND:

Left-hand
Right-hand

51. MAGNETIC CONTACTOR:

Magnetic Contactor

52. FUSING PER STEP:

Fusing per Step

53. DOOR DISCONNECT:

Door Interlocking Fused Disconnect
Door Interlocking Non-Fused Disconnect

54. MAIN FUSING:

Main Fusing

55. DRAIN PAN:

IAQ Galvanized Drain Pan
IAQ Stainless Steel Drain Pan

56. SECONDARY DRAIN CONNECTION:

None
Drain Connection

57. DRAIN PAN HANDING:

Right Hand
Left Hand

58. DRAIN PAN FLOAT SWITCH

None
Drain Pan float Switch

59. FILTER:

2" Throwaway
2" 30% Pleated (Merv 8)
2" 30% Pleated (Merv 8), 4" 65% Pleated (MERV 11)
2" 30% Pleated (Merv 8), 4" 85% Pleated (MERV 14)
2" 30% Pleated (Merv 8), 4" 95% Pleated (MERV 15)

60. SPARE FILTER:

2" Throwaway Spare Filter
2" 30% Pleated Spare (Merv 8)
4" 65% Pleated Spare (MERV 11)
4" 85% Pleated Spare (MERV 14)
4" 95% Pleated Spare (MERV 15)

61. BASE RAILS:

Base Rails

62. INSULATION TYPE:

Standard Fiberglass
Foil Faced Fiberglass
Closed Cell Foam
Double Wall

63. ACCESS DOOR:

Standard
Hinged Doors with Lift and Turn Fasteners

64. VIBRATION:

Rubber in Shear
Spring

65. AQUASTAT

Aquastat

66. THERMOSTAT:

D-Series Digital (No 7 Day program),
On/Off Actuator
P-Series Digital (7 day Program),
On/Off Actuator
N-Series Digital (Networking Compatible),
On/Off Actuator
F-Series Digital (Networking Compatible),
Floating Point Actuator
V-Series Digital (Networking Compatible),
Proportional Actuator

67. THERMOSTAT LOCATION:

Remote Mounted Thermostat
Unit Mounted Thermostat