BARD MANUFACTURING COMPANY, INC.

Q-TEC™ Q24H-Q48H Series Air-to-Air H/P

Engineering Specification Guide

General Information: Single Packaged Vertical Indoor Mount Air Source Heat Pump

1. Submittals

a. Provide submittal in accordance with Division 01 and Section 15.

b. Submittals for Single Packaged Vertical Indoor Mount heat pump shall include equipment performance, dimensions, required clearances and electrical requirements and connections. Equipment shall include the following performance data: CFM, EER, COP, Total, Sensible, Latent capacities at standard AHRI conditions and for all stages of operation. Submittals shall also include performance at conditions listed on the schedule

c. Complete exterior Louver performance information. Louver shall be provided by SPVU manufacturer.

d. Factory Warranty documentation verifying 5-year compressor and 5-year parts warranty.

e. Control submittal if controller is provided by equipment manufacturer.

f. Equipment shall be provided by Bard Manufacturing or approved equal.

2. Quality Assurance

a. Design, construction, testing and installation shall comply with the following standards as applicable:

1) UL or ETL classified in accordance ANSI/UL 1995/CSA 22.2 No. 236-05 fourth edition.

2) Certificate of performance by AHRI or another independent third-party testing agency. AHRI or third-party testing will be in accordance with the Air Conditioning Heating and Refrigeration Institute (AHRI) Standard 390-2003 for Single Package Vertical Units (SPVU). Self-test data provided “in accordance with AHRI 390-2003” will not be accepted or considered as alternate. Consideration for exceptions will require testing by a third-party agency preapproved by the specifier and accompanying statement of indemnification from the Manufacturer.

b. Unit shall be manufactured by an ISO 9001:2015 Certified Manufacturer, and successfully manufactured SPVU equipment continuously, for a minimum of 5 years.

3. Operating Characteristics

a. Unit shall be capable of simultaneous heating duty and defrost cycle operation when using accessory electric strip heat. Unit electric nameplate shall display required electric circuit. Factory installed adjustable control allowing for optional low amp draw operation preventing simultaneous operation of compressor and strip heat shall not be allowed. Only dedicated low ampacity units manufactured and shipped with correct electric nameplate data shall be accepted.

4. Warranty

a. Unit shall include a full 5-year parts warranty covering compressor, sealed refrigeration system, heat exchange coils, ventilation packages, as defined by the terms and conditions of Bard Limited

Warranty agreement. Labor is excluded in the Bard standard warranty. Any non-equivalent 5-year compressor, 1 year parts warranty will not be accepted. All parts warranty documentation shall be included in submittal data. Any exceptions to a manufacturer's standard warranty must be acknowledged in writing by the Manufacturer's Senior Manager.

5. Training, Commissioning, and Technical Support

a. Optional on-site, remote, and video training available, see www.bardhvac.com for additional information.

b. Optional on-site commissioning available, see www.bardhvac.com for additional information.

c. Standard technical services from Bard using trained, experienced and technical staff. Both phone and video support services available, see www.bardhvac.com for additional information.

d. Installation shall be in full accordance to the Manufacturer's instructions, generally accepted practices and all applicable codes.

General Equipment Requirements

6. Capacity and efficiency

a. Capacities of Heat Pumps as indicated on drawing and schedules are net capacities required.

b. Efficiencies shall be at AHRI conditions and submitted performance shall be at specified conditions per the schedule.

c. Furnish and install a self-contained, vertical, floor standing, interior mount, thru-the-wall heat pump to be manufactured by Bard Manufacturing Company.

d. Units shall be self-contained vertical packaged (SPVU) heat pumps. Cooling performance shall be tested and certified by AHRI per Standard 390-2003 and listed in the AHRI database. AHRI certificate shall be included in submittal data. If AHRI documentation is not available, third party performance certification by an agency preapproved by the specifier may be considered. Third party submittals of capacity and efficiency in heating and cooling shall be provided 10 days prior to bid and include statement of performance indemnification from the Manufacturer.

7. Cabinet and Component Construction

a. Constructed of 20-gauge pre-painted steel and consisting of galvanized steel in accordance with ASTM A653, modified acrylic primer .25 MIL., topcoat paint shall be .75 MIL. Exterior panels shall be double wall construction with no screws exposed on the exterior panels.

b. Front panel is hinged and lockable. Front panel provides for filter service, unit service and access to primary functional electrical controls.

c. Back of unit to be painted in neutral color to reduce visibility from outdoors.

d. Colors options: Vinyl Coated Steel, Beige or Gray.

e. No fiberglass shall not be utilized in any part of the unit. Insulation shall be environmentally friendly, free of formaldehyde and constructed of from recycled natural fibers. Recycled natural fibers include post-consumer and post-industrial cotton denim that is thermally bonded together to create a superior thermal and acoustical insulation product. Insulation must meet UL 723 requirements including flame/smoke rating.

f. The evaporator coil shall have a standard hydrophilic protective fin coating. Aluminum evaporator fins exposed to return air not acceptable. Approved protective coating may be applied by others after manufacture. The fin coating is green in color. The fin coating shall provide resistance to the following corrosive agents: Ammonia, Sodium Hydroxide, Sodium Chloride, Acidic solutions, and solvents. Salt spray corrosion testing per ASTM B177 shall have no effect after 500 hours. Acidic Brine Immersion testing per HTM0039 shall have no effect after 120 hours.

g. **OPTIONAL**: The condenser coil and or evaporator shall have a Technicoat AA option for advanced corrosion protection or equivalent. Technicoat AA has the following properties:

1) Pass 10,000 hours of salt spray testing per ASTM B 117.

2) Pass 3,000 hours of acetic salt spray testing per ASTM G85.

3) Pass 40 cycles DIN 50018 Kesternich Sulphuric testing.

4) 25 micron or 1 mil coating thickness.

5) Dipped application process to coat fin pack core, header, and hairpin tubes.

6) Contains 18 grams or less of VOC per liter of coating material.

h. Front panels shall be easily removable for service.

i. Unit shall be suitable for right or left-hand corner installation without modification. No clearance is required for service access. All service access shall be thru the front of the unit with the exception of the condenser fan and motor. Side supply grilles on accessory ductless plenum box shall include adjustable opposed damper to balance airflow for each side discharge and in corner installations.

8. Filters

a. Unit shall be factory furnished with 2" pleated primary filters and have a Minimum Efficiency Reporting Value of MERV 8 per ASHRAE standard 52.2. Filters available in the following ratings:

1) MERV 8

2) MERV 11

3) MERV 13

b. All filters shall be accessible thru front of unit. Filter size shall be readily available commercial sizes.

c. Outdoor ventilation intake air shall be pre-filtered with a secondary washable metal mesh filter before entering the ventilation option area. The purpose of the filter is to remove debris from the air stream and protect the ventilation components.

9. UVC-LED (Optional with MERV 13 Filter)

a. Provides ultraviolet germicidal irradiation (UVGI) that disinfects the air through short wavelength ultraviolet light.

b. UVC light system is rated for 7 to 10 years without required bulb maintenance.

c. UVC light will be factory or field installed.

10. Compressors

a. Shall be single stage hermetically sealed scroll compressor.

b. The refrigeration circuit shall include liquid line filter dryer, refrigerant service ports, discharge muffler.

c. High and low-pressure control with auto reset shall be factory installed. Control board shall provide high/low pressure diagnostics, adjustable voltage protection and delay on make-or-break Refrigerant shall be R-410A.

d. liquid line filter dryer, refrigerant service ports, discharge muffler

e. The compressor shall be mounted on double floating isolation mounting system and fitted with a factory installed sound attenuation jacket.

11. Condensate Drain System

a. Condensate shall be removed from the unit by connections located in the right side back of the unit. Optional side drain is available.

b. Both indoor and outdoor coils shall have drain pans constructed of non-corrosive materials. No standing water in the drain pan.

12. ECM Enclosed Condenser Motor

a. The condenser fan motor shall be enclosed casing motor with ball bearings. ECM technology shall be used to provide quiet, efficient operation. PSC motors are not acceptable.

13. ECM Indoor Blower Motor

a. The indoor blower motor shall be electronically commutated (ECM) and factory programmed to produce rated air flow for each model.

b. The motor shall be pre-programmed for 20-second ramp up and 60-second down rate for quiet and smooth starting and stopping.

c. PSC motor shall not be acceptable.

14. Electrical Components and Controls

a. Electrical components shall be easily accessible for routine inspection and maintenance through front service panels.

b. Circuit breaker shall be standard on all 208/230-volt models and a disconnect standard on all 460-volt models.

c. Circuit breaker/disconnect access is through lockable access panel. Lock and key are to be provided with each unit.

d. Unit shall have single point entry for line voltage. Electrical component access point shall be located at standard eye level to allow easy serviceability.

e. The internal low voltage control circuit shall consist of a current limiting 24 VAC type 75 VA transformer with circuit breaker.

f. Defrost control shall be by temperature and time. After 30, 60 or 90 minutes (selectable) the heat pump control shall place the system in defrost mode. The defrost circuit shall consist of a solid-state electronic heat pump control. A 90-minute timer (factory setting) shall initiate a defrost cycle if the outdoor coil temperature indicates the possibility of an iced condition. The thermistor sensor, speed-up terminal for service and a ten-minute defrost override shall be standard on the electronic heat pump control.

g. To prevent rapid compressor short cycling, a five-minute time delay circuit shall be incorporated into the heat pump control board. A low-pressure bypass shall be incorporated into the heat pump control board to prevent nuisance tripping during low temperature start-up.

h. All units with 3-phase power shall include factory installed phase rotation monitor. This device shall protect scroll compressor from reverse rotation and protect unit from phase failure. If 3-phase power is incorrectly connected at the field power connections, the phase monitor shall lock out the unit and a red light will illuminate indicating incorrect phase. If unit is wired correctly a green light will illuminate. If a power leg is lost, the phase monitor will lockout the unit due to phase imbalance. Once the condition is corrected, turning the power off at the circuit breaker or disconnect will reset the phase monitor.

i. Optional door mounted thermostat wiring kit with wiring harnesses (IDMCK).

15. Hot Gas Reheat Dehumidification (Recommended for use with ventilation)

a. The dehumidification option shall incorporate an independent reheat coil in the supply air stream in addition to the standard evaporator coil, 2-way valve, solid state dehumidification circuit board, and independent dehumidification terminal on 24-volt control terminal strip.

b. The coil shall be mounted after the evaporator coil and sized to nominally match the sensible cooling capacity. Heat source for reheat must be waste heat from high pressure/temperature refrigerant. Electric reheat shall not be acceptable.

c. The solid-state dehumidification circuit will monitor the 24-volt terminal for a call for dehumidification. If the humidity rises above a set point the dehumidification terminal is energized the dehumidification control board shall:

1) Monitor unit operation. If dry bulb temperature is satisfied and no call for cooling or heating is active, the unit will energize in cooling mode and energize the 2-way valve so that reheat coil becomes active.

2) If the unit is operating in cooling or heating at the time of the call for dehumidification, the unit shall remain in cooling or heating until comfort temperature set point is satisfied. If the high humidity call is still active, the unit will then operate in dehumidification mode.

3) If a call for cooling or heating is received during dehumidification operation, the solid-state board will de-energize the 2-way valve. The unit will operate in active cooling or heating mode until dry bulb set point is satisfied.

4) If the humidity set point control is satisfied and no call for cooling or heating is active the unit will cycle off.

16. Ventilation Packages (Select one option)

a. Energy Recovery Ventilator (ERV) Option 1

1) Energy Recovery module shall consist of 2 rotary wheels in an insulated cassette frame complete with silica gel desiccant permanently bonded, seals, drive motor, belt, intake and exhaust blowers. Dampers will be used to prevent infiltration during off periods.

2) The inherit design of the ERV shall be such as to promote self-cleaning in standard conditions.

3) Intake and exhaust blower motors shall be fractional horsepower ECM motors providing either 4 selectable cfm levels (500, 450, 375, 300) or modulating cfm based on 0-10vdc modulating signal from a control source. Intake and exhaust airflow shall be independently adjustable providing for positive pressurization of the space.

4) The ERV thermal performance shall be certified by BOTH the manufacturer of the ERV media and the Manufacturer of the HVAC equipment. In accordance with ASHRAE Standard 84, Method of Testing Air-to Air Heat Exchangers and ARI Standard 1060, Rating for Air-to-Air Energy Recovery Ventilation Equipment Cassettes shall be listed in the ARI Certified Products. Unit complies with ANSI/ASHRAE Standard 62.1 Ventilation for Acceptable Air Quality.

5) The energy transfer media shall include enthalpy transfer utilizing silica gel desiccant of other media with high latent transfer capability. All components of the ERV assembly shall be warranted (parts only) 5 years from date of installation. ERV performance at design conditions shall be furnished upon request.

b. Commercial Room Ventilator Option 2

1) Commercial Room Ventilator shall consist of motorized, adjustable position damper, providing ventilation air up to 50% of rated airflow of the unit.

2) Damper system includes exhaust air path. Blade stops are easily adjustable and include marked damper positions.

3) Damper shall be motorized, 2 position with spring return.

c. Blank Off Plate (BOP) Option 3

1) Blank off plate shall consist of insulated plates to seal off air paths inside the unit that are normally used for ventilation.

2) Intake air paths are removed along with the exhaust air damper assembly. No ventilation will be provided with this option.

d. Economizer Option 4

1) Economizer shall provide up to 50% rated airflow of unit when outdoor conditions are cool and dry enough to provide adequate cooling capacity in lieu of compressor operation.
2) Economizer package includes exhaust air damper.
3) Jade economizer controls shall provide demand ventilation control, operational checkout, configurable freeze protection, and LCD displayed economizer component failure alarms. Minimum vent position, occupancy ventilation, and 0-10V CO2 input is available for use with select CO2 room sensors. Economizer operation shall be controlled by outdoor dry bulb or outdoor enthalpy measurement.

Required Accessories

17. Wall Sleeve

a. SPVU manufacturer shall furnish a properly sized wall plenum for intake and exhaust condenser air, including intake and exhaust air path for ventilation air.

b. Wall sleeve shall be constructed of galvanized steel, coated with an epoxy primer, and baked on polyester enamel paint. Wall sleeve casing shall be capable of withstanding 1000-hour salt spray exposure per ASTM B117-03.

c. Sleeve shall be available in various depths to mate with depth of exterior wall. Select One:

14” deep sleeve- for exterior wall depth 14” or less
16” deep sleeve- for exterior wall depth 16” or less
19” deep sleeve- for exterior wall depth 19” or less
20” deep sleeve- for exterior wall depth 20” or less
23” deep sleeve- for exterior wall depth 23” or less
30” deep sleeve- for exterior wall depth 30” or less

18. Outdoor Wall Louver

a. Wall louver shall be provided by the unit manufacturer. Louver shall be tested with the unit to ensure proper unit operation during various outdoor conditions.

b. Louver shall include .500” mesh hardware cloth to restrict debris from entering the condenser area of the unit.

c. Louvers shall be constructed of mill finish Aluminum and several custom powder-coat finishes to integrate into the building design. Factory standards colors include dark bronze, medium bronze, or aluminum. Color chart shall be provided for additional color options if required.

Optional Cabinet Accessories

19. Standard Top Discharge Plenum Box

a. Supply air discharge plenum box shall be provided by manufacturer.

b. Exterior finish shall match unit finish, lined with sound deadening insulation. Insulation shall be covered with acoustically designed perforated galvanized metal.

c. Duct free Plenum box shall include 1 or 2 front discharge diffusers and may include one diffuser on each side of the plenum box.

20. Hot Water Top Discharge Plenum Box

a. Supply air discharge plenum box shall be provided by manufacturer.

b. Exterior finish shall match unit, lined with sound deadening insulation. Insulation shall be covered with acoustically designed perforated galvanized metal.

c. Plenum box shall include 1 or 2 front discharge diffusers and may include one diffuser on each side of the plenum box.

d. Plenum Box shall contain a 2 circuit Copper/Aluminum coil with copper connections for both water in and water out. Optional 2-way and 3-way valve packages available.

21. Top Cabinet Extension

a. Three-sided assembly manufactured of pre painted steel in matching unit color to fill space from top of unit or plenum box to ceiling.

b. For use on ducted or plenum box installations.

22. Side Trim Kit

a. Side trim pieces manufactured of pre painted steel matching unit color.

b. Side trim pieces be used to trim out space between rear sides of unit and exterior wall. Side trim pieces include the following depths:

1) 4" Trim

2) 10" Trim

3) 13" Trim

4) 16" Trim

Environmental Controls Accessories (Select One Option)

23. Advanced Environmental Unit Controls – CompleteStat

a. 4H/2C with 2 Stage Compressor Operation and 1 or 2 stage electric heat.

b. No battery 72-hour clock retention, non-volatile memory for all other settings.

c. Automatic or manual changeover, Auto, On, Programmed Fan Operation.

d. Occupancy per schedule or motion and dedicated ventilation terminal.

e. Programmable (7-day, 5+2, individual days, up to 12 holidays) or non-programmable.

f. Selectable Maximum Heat and Minimum Cool Settings.

g. Built-in De-Humidistat, Range 50 to 75% RH, Span 5-10%.

h. Dehumidification Control-Occupied Only or Full Time Dehumidify.

i. Backlit LCD display with unit operation icons, Simple 5-Button User Interface.

j. Unit service alarm input, 9 Output relays total. Built-in alarms and trend logs.

k. BACnet capable for MS/TP, EIA-485 using 2-wire shielded twisted pair.

l. Adaptive occupancy (learning) scheduling based on motion sensor.

m. Standard wide range occupancy sensor: up to 33 ft, 120° horizontal, 100° vertical.

n. Configurable password protection w/ 3 levels of access.

o. User selectable emergency heat mode.

p. Optional built-in CO2 sensor. (CS9B-THOCA and CS9BE-THOCA models).

q. Optional ethernet CAT 5 port for ease of networking (CS9BE-THOA and CS9BE-THOCA models).

r. Optional 10k type 2 Outdoor remote sensor.

s. Optional 10k type 2 Indoor remote sensor.

24. Advanced Environmental Unit Controls – BrightStat

a. 3H/2C with 2 Stage Compressor Operation.1 stage electric heat (Additional Em. Heat stage w/LUA)

b. No battery 72-hour clock retention, non-volatile memory for all other settings
c. Automatic or manual changeover. Smart fan output for fan on during occupied times
d. Occupancy per schedule, on/off ventilation or modulating 0-10V output w/optional CO2 card.
e. Programmable (7-day, individual days) or non-programmable.
f. Selectable Maximum Heat and Minimum Cool Settings.
g. Built-in De-Humidistat, Range 30 to 95% RH, Span 5-10%.
h. Color Touchscreen display with multiple screen color and icon configurations.
i. Unit service alarm input, configurable I/O with custom LUA programming options.
j. Modulating 0-10V heat option for indoor units with hot water plenum option.
k. User selectable 2nd stage emergency heat mode (LUA Script file required).
l. Configurable password 4 pin lock of configuration menu.
m. Adaptive learning predicts how long it takes to reach setpoint.
n. BACnet or Modbus capable using 2-wire shielded twisted pair.
o. Optional 10k type 2 Outdoor remote sensor.
p. Optional 10k type 2 Indoor remote sensor.
q. Optional ZigBee wireless card for wireless networking.
r. Optional CO2 card for 0-10V ventilation control.
s. Optional built-in motion sensor. Wide range occupancy sensor: up to 20 ft, 120° horizontal, 30° vertical.

25. Advanced Thermostat Controller – 8403-060

a. 3H/2C with 2 stage compressor operation. 1 stage electric heat with additional Em. Heat stage.
b. Digital 7 day programmable or 5+2 day, or non-programmable.
c. No battery 24-hour clock retention, non-volatile memory for all other settings.
d. Automatic or manual changeover. Events per day: Residential 2 or 4, Business 2.
e. Occupancy per schedule and a dedicated ventilation terminal.
f. Vacation Hold, Permanent Hold Fan Operation----Auto-On-Programmed.
g. Selectable Maximum Heat and Minimum Cool Settings.
h. Built-in De-Humidistat (configure for non-economizer), Range 45 to 90% RH.
i. Dehumidification Control - Occupied Only or Full Time Dehumidify.
j. Simple 5-Button User Interface Screen Displays with RH-Temp-Mode-Fan-Menu.
k. Unit service alarm input.
l. User selectable emergency heat mode.
m. Menu Driven Security Lockout, Test Mode, Service Information.
n. Smart recovery, Intermittent Fan Option.
o. Selectable Backlight Periods: 30-60-90-120 Seconds, Continuous.
p. Optional 10k type 2 Outdoor remote sensor.
q. Optional 10k type 2 Indoor remote sensor.

26. User Supplied Thermostat, Controller, or Direct DDC Control.

a. Control of unit operation supplied using 24VAC signals from a field supplied device.
b. Unit has a low voltage terminal connection area with easy to access connection points.