BARD MANUFACTURING COMPANY, INC.
I-TEC™ I36Z-I60Z Series Air-to-Air H/P
Engineering Specification Guide

General Information: Single Packaged Vertical 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 or air conditioner shall include equipment performance, dimensions, required clearances and electrical requirements and connections. Two stage equipment shall include the following performance data: CFM, EER, COP, IPLV, Total, Sensible, Latent capacities at standard AHRI conditions and for all stages of operation. Submittals shall also include performance at design conditions per 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.
   b. Indoor supply airflow shall automatically adjust to maintain constant cfm at rated airflow independent of external static pressure up to .5″ WC.

4. **Warranty**
   a. Unit shall include a full 5-year parts warranty covering compressor, sealed refrigeration system, heat exchange coils and 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 shall 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 technical staff. Both phone and video support services available, see www.bardhvac.com for additional information.
   d. Installation shall be in full accordance with 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 and 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, consisting of galvanized steel in accordance with ASTM A653, modified acrylic primer .25 MIL. and topcoat paint shall be .75 MIL. Exterior panels shall be double wall construction, no screws exposed on the exterior panels.

b. Front doors are hinged and lockable. Front doors provide for filter service, unit service and access to primary functional electrical controls. Front doors and side panels are easily removable for separation of top and bottom sections.

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

d. Colors options: Beige, Gray or White.

e. No fiberglass shall 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. 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. Exterior panels shall be easily removed and cabinet shall consist of two modules with refrigeration system contained in top section. The two sections can be easily separated by removing 4 bolts. Fork slots allow for the top module to be lifted and separated. Each module shall pass thru a standard door frame and/or into standard sized elevator doors without tilting or laying equipment down.

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. 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 MERV8 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 foam media filter before entering the ventilation option area. The purpose of the filter is to remove debris from the airstream and protect the ventilation components.

d. Indoor room ventilation exhaust air shall be pre-filtered with a secondary disposable filter media before entering the ventilation option area. The purpose of the filter is to remove debris from the airstream 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 2-stage hermetically sealed scroll compressor with internal unloading providing 2 stages of heating and cooling operation.

b. The refrigeration circuit shall be equipped with factory installed high and low-pressure control with resettable lockout circuit. An internal overload shall protect the compressor against excessive motor temperatures and currents. Refrigerant shall be R-410A.

c. Refrigeration circuit will include thermostatic expansion valve (TXV), liquid line filter dryer, refrigerant service ports and discharge muffler. Service gauge access ports shall be available without removing any panels.

d. 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 back of the unit. Primary and secondary drains shall be provided so that if the primary drain is restricted, the secondary drain will allow condensate to leave the unit. Condensate drain lines in the unit will be black in color (not clear) to deter algae growth.

b. Both indoor and outdoor coils shall have drain pans constructed of non-corrosive materials and shall not allow standing water in the drain pan. The condenser drain pan shall have a discharge refrigerant loop or other means to keep ice from building up under the condenser coils.

c. A factory installed condensate overflow protection system shall monitor both drain pans and shut down system to prevent condensate overflow. A light shall be provided to indicate when the condensate switch is activated.

12. Modulating Outdoor Condenser Motor

a. The condenser fan motor shall be electronically commutated motor-ECM. Motor shall provide variable speed operation, ball bearing, 6KV surge protection and matched to a sweep designed low noise composite condenser fan.

b. Factory integrated modulating low ambient control shall be provided as standard. Condenser fan speed shall be controlled by a 10k sensor mounted in the condenser intake airstream for condenser fan sound reduction. On/Off low ambient control shall not be acceptable unless documented 5-year condenser fan motor warranty provided with submittals and signed by the Manufacturer.

13. Variable Speed Indoor Blower Motor

- **a.** The indoor blower motor shall be electronically commutated variable speed (ECM), factory programmed to produce rated air flow from 0″ to .5″ WC of external static pressure.
- **b.** The motor is to be self-adjusting to provide proper rated air flow at high static pressures without user adjustment or wiring changes by the user.
- **c.** The motor shall be pre-programmed for 20-second ramp up and 60-second down rate for quiet, smooth starting and stopping.
- **d.** PSC motor shall not be acceptable.
- **e.** Motor shall automatically adjust to proper blower speeds matching compressor operation: ultra-quiet ventilation only, stage 1 cooling, stage 2 cooling, stage 1 heating, stage 2 heating and continuous circulation ventilation mode. Single speed fan operation 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 a 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 and 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 in addition 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.

15. Ventilation Packages (Select one option)

a. Multi-Speed Commercial Room Ventilator (CRV) Option

1) Commercial Room Ventilator module shall consist of intake and exhaust blowers to bring in outdoor air and exhaust room air. Dampers will be used to prevent infiltration during off periods.

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

3) Intake and exhaust blower motors shall be fractional horsepower ECM motors providing 3 selectable cfm levels (450, 375, 300). Intake and exhaust airflow shall be independently adjustable providing for positive pressurization of the space.

b. Jade Economizer (ECON) Option

1) Economizer module shall consist of an insulated assembly complete with insulated blades with low leakage dampers.

2) Dampers are tested in accordance with AMCA 500D to meet the 4cfm/ft2 allowable leakage section of AMCA 511. Leakage tests are conducted in accordance with AMCA Standard 500-D-2012 entitled "Laboratory Methods for Testing Dampers for Rating".

3) The inherit design of the economizer is to provide energy saving cooling operation when conditions outside are acceptable. Setpoints shall be user adjustable for efficient economizer operation. Enthalpy version of economizer shall monitor both outdoor temperature and outdoor humidity levels to provide comfortable indoor conditions with economizer operation.

4) Intake and exhaust paths shall be provided to bring outdoor air into the indoor area and exhaust room air to provide a slight amount of positive room pressure.

5) Economizer shall have powered exhaust system to minimize room pressure.

6) Controls for economizer operation shall provide a display for easy setup in the field, diagnostics and damper operation checkout procedure to verify proper damper operation. Display shall also show the economizer mode of operation

and status. Input for a 0-10VDC signal from a CO2 occupancy sensor must be present for outdoor air intake.

7) Economizer actuator motor shall provide feedback to economizer controls regarding operation and functionality. Linkage shall be centrally located in damper assembly to ensure uniform sealing when damper blade(s) are closed.

c. Blank Off Plate (BOP) Option

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.

Required Accessories

16. 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. Sleeve shall be telescoping for adjustable depth to match wall thickness, and adjustable 3" height from 31" to 34" AAF, or higher with factory supplied subbase.

c. 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.

d. Wall sleeve color shall be dark bronze or equivalent color to minimize sleeve visibility behind louver.

17. Outdoor Wall Louver

a. 1", 2" and 4" depth wall louver solutions shall be provided by the unit manufacturer. Louver solutions 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-coated 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

18. Standard Top Discharge Plenum Box

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

19. Hot Water Top Discharge Plenum Box

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

b. Exterior finish shall match unit and 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.

20. Top Cabinet Extension

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

b. For use on ducted or plenum box installations.

21. Riser Platform

a. Riser platform manufactured of pre painted steel matching unit color.

b. Platform shall be used to elevate unit wall sleeve penetration if required to match existing wall opening height, existing windowsill height or other custom height requirement. Riser platforms include the following sizes:

1) 3″ Riser
2) 6″ Riser
3) 9″ Riser
4) 11″ Riser
5) 14″ Riser

22. Side Trim Kit

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

b. Side trim pieces will 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) 6″ Trim
3) 8″ Trim
4) 10″ 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 and 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 and 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 and 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.