

## VERTICAL STACK GEOTHERMAL HEAT PUMP (VSHPG) CERTIFIED DRAWING

DWG. NO. \_\_\_\_\_  
**Submittal Template Geo VSHPG**  
 REV. - 02

|             |  |                   |         |     |      |    |           |             |
|-------------|--|-------------------|---------|-----|------|----|-----------|-------------|
| PROJECT     |  | DATE              | 6/19/20 |     | BY   | JL | REVISIONS |             |
| PURCHASER   |  | P.O. #            |         | QTY | DATE |    | BY        | DESCRIPTION |
| ARCHITECT   |  | SHIPPING<br>DATES |         |     |      |    |           |             |
| ENGINEER    |  |                   |         |     |      |    |           |             |
| HVAC CONTR. |  |                   |         |     |      |    |           |             |
| GEN. CONTR. |  |                   |         |     |      |    |           |             |

| DESIGNATION | MODEL NUMBER | QTY |
|-------------|--------------|-----|
|             |              |     |
|             |              |     |
|             |              |     |
|             |              |     |
|             |              |     |
|             |              |     |
| TOTAL       |              |     |

### UNIT SPECIFICATIONS+ PERFORMANCE DATA

| MODEL             | 8VSHPG09 | 8VSHPG12 | 8VSHPG15 | 8VSHPG18 | 8VSHPG24 | 8VSHPG30 |
|-------------------|----------|----------|----------|----------|----------|----------|
| COOLING CAPACITY  | 11,000   | 13,800   | 15,000   | 19,500   | 24,800   | 30,000   |
| SENSIBLE CAPACITY | 9,500    | 10,800   | 12,100   | 15,400   | 18,600   | 24,000   |
| COOLING EER       | 21.30    | 20.10    | 17.50    | 18.70    | 18.40    | 17.30    |
| HEATING CAPACITY  | 6,500    | 9,000    | 10,500   | 13,400   | 17,000   | 21,900   |
| HEATING COP       | 3.64     | 3.70     | 3.70     | 3.63     | 3.66     | 3.60     |
| FLOW RATE (GPM)   | 2.25     | 3        | 3.75     | 4.5      | 6        | 7.5      |
| AIR FLOW (CFM)    | 460      | 500      | 560      | 620      | 800      | 1000     |

TABLE 1

COOLING CAPACITY BTUH RATED @ 80.6°F, 66.2°F WB EAT; 77°F EWT @ 3 GPM/TON  
 HEATING CAPACITY BTUH RATED @ 68°F DB, 59°F WB EAT; 32°EWT @ 3 GPM/TON

### PHYSICAL DATA

| MODEL                                   | 8VSHPG09  | 8VSHPG12  | 8VSHPG15  | 8VSHPG18  | 8VSHPG24  | 8VSHPG30  |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
| COMPRESSOR TYPE (1 EA)                  | ROTARY    |           |           |           |           |           |
| REFRIGERANT                             | R410A     |           |           |           |           |           |
| REFRIGERANT FACTORY CHARGE (oz)         | 31.4      | 33.5      | 30.0      | 33.5      | 49.4      | 71.9      |
| FAN MOTOR (W)                           | 186       | 186       | 186       | 186       | 186       | 372       |
| BLOWER WHEEL SIZE (DIAMETERXWIDTH) (IN) | 7X7       | 7X7       | 7X7       | 7X7       | 8X8       | 8X8       |
| HOSES (IN)                              | 3/4       | 3/4       | 3/4       | 3/4       | 3/4       | 3/4       |
| WATER CONNECTION SIZE (IN)              | 3/4       | 3/4       | 3/4       | 3/4       | 3/4       | 3/4       |
| CONDENSATE CONNECTION SIZE (IN)         | 3/4" ID   |           |           |           |           |           |
| AIR COIL DIMENSION (IN)                 | 26X12.2   | 26X12.2   | 26X12.2   | 26X12.2   | 28X17.13  | 28X17.13  |
| STANDARD FILTER-1"                      | 31.1X15.9 | 31.1X15.9 | 31.1X15.9 | 31.1X15.9 | 31.6X19.8 | 31.6X19.8 |
| AC CHASSIS WEIGHT (LB)                  | 134       | 134       | 136       | 137       | 158       | 160       |
| CABINET WEIGHT (LB)                     | 180       | 180       | 182       | 183       | 258       | 260       |

TABLE 2

### GENERAL NOTES

- 1: PROVIDE UNITS WITH R410A GREEN REFRIGERANT
- 2: PROVIDE 1" WASHABLE FILTERS
- 3: PROVIDE OVERFLOW CONDENSATE SWITCH
- 4: PROVIDE STANDARD UNIT-MOUNTED DIGITAL CONTROL BOARD
- 5: PROVIDE PAINTED FRONT ACCESS PANEL.
- 6: PROVIDE INTEGRAL TRAPPED CONDENSATE LINE RUN OUT

### OPTIONAL

- 1: STAINLESS STEEL HOSE KITS
- 2: MOTORIZED TWO-WAY CONTROL VALVE
- 3: BALL VALVES
- 4: DOUBLE DEFLECTION SUPPLY GRILLES
- 5: UNIT-MOUNTED FLOW CONTROL VALVE

### CUSTOM NOTES

- 1:

**VERTICAL STACK GEOTHERMAL  
HEAT PUMP (VSHPG) CERTIFIED DRAWING**

DWG. NO. **Submittal Template Geo VSHPG**  
REV. -

|             |  |                   |         |     |      |    |           |             |
|-------------|--|-------------------|---------|-----|------|----|-----------|-------------|
| PROJECT     |  | DATE              | 6/19/20 |     | BY   | JL | REVISIONS |             |
| PURCHASER   |  | P.O. #            |         | QTY | DATE |    | BY        | DESCRIPTION |
| ARCHITECT   |  | SHIPPING<br>DATES |         |     |      |    |           |             |
| ENGINEER    |  |                   |         |     |      |    |           |             |
| HVAC CONTR. |  |                   |         |     |      |    |           |             |
| GEN. CONTR. |  |                   |         |     |      |    |           |             |

**UNIT SPECIFICATIONS+**

**ELECTRICAL DATA**

TABLE 3

| MODEL    | VOLTAGE/HZ-PHASE | COMPRESSOR RLA | COMPRESSOR LRA | FAN MOTOR FLA | MCA  | MOP  | FUSE SIZE |
|----------|------------------|----------------|----------------|---------------|------|------|-----------|
| 8VSHPG09 | 208-230/60-1     | 3.25           | 20             | 2.0           | 6.6  | 9.3  | 15        |
| 8VSHPG12 | 208-230/60-1     | 4.1            | 27             | 2.0           | 7.6  | 11.2 | 15        |
| 8VSHPG15 | 208-230/60-1     | 5.5            | 28.5           | 2.0           | 9.4  | 14.4 | 15        |
| 8VSHPG18 | 208-230/60-1     | 6.1            | 35.6           | 2.0           | 10.1 | 15.7 | 15        |
| 8VSHPG24 | 208-230/60-1     | 9.15           | 43             | 2.0           | 13.9 | 22.6 | 20        |
| 8VSHPG30 | 208-230/60-1     | 11.25          | 62             | 3.98          | 19   | 29.3 | 25        |

**AIR FLOW CORRECTION TABLE**

TABLE 4

|                 | % OF RATED AIR FLOW | 70%  | 75%  | 80%  | 85%  | 90%  | 95%  | 100% | 105% |
|-----------------|---------------------|------|------|------|------|------|------|------|------|
| COOLING FACTORS | TOTAL CAPACITY      | 0.92 | 0.93 | 0.95 | 0.96 | 0.97 | 0.99 | 1.00 | 1.02 |
|                 | SENSIBLE CAPACITY   | 0.80 | 0.83 | 0.87 | 0.90 | 0.93 | 0.97 | 1.00 | 1.04 |
|                 | POWER               | 0.97 | 0.97 | 0.98 | 0.99 | 0.99 | 1.00 | 1.00 | 1.01 |
|                 | HEAT REJECTION      | 0.94 | 0.95 | 0.96 | 0.97 | 0.98 | 0.99 | 1.00 | 1.01 |
| HEATING FACTORS | HEATING CAPACITY    | 0.94 | 0.95 | 0.96 | 0.97 | 0.98 | 0.99 | 1.00 | 1.01 |
|                 | POWER               | 1.08 | 1.06 | 1.05 | 1.04 | 1.02 | 1.01 | 1.00 | 0.99 |
|                 | HEAT EXTRACTION     | 0.93 | 0.95 | 0.96 | 0.97 | 0.98 | 0.99 | 1.00 | 1.01 |

**AIR TEMPERATURE CORRECTION TABLE**

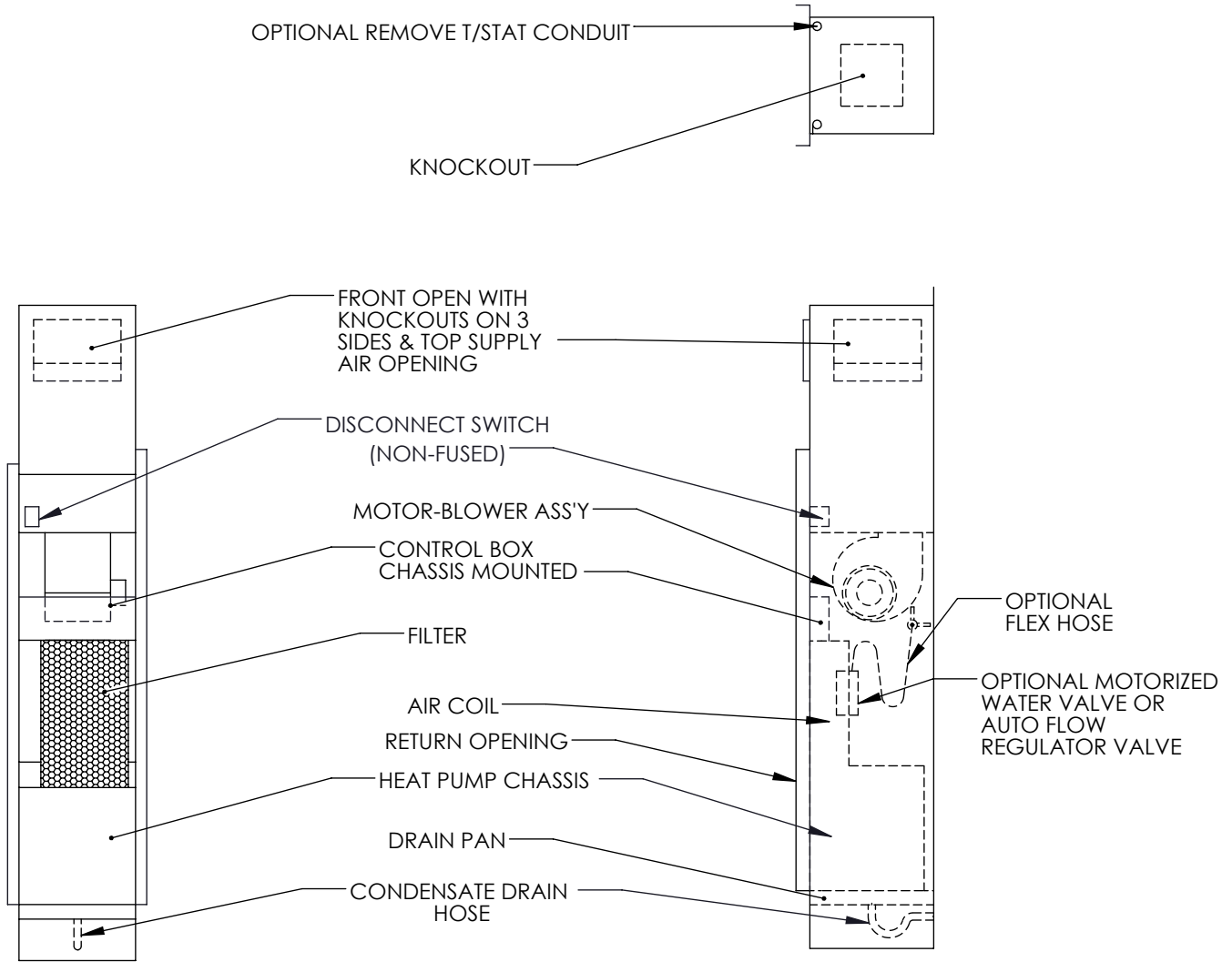
TABLE 5

| HEATING                 |      |      |      |      |      |      |      |      |
|-------------------------|------|------|------|------|------|------|------|------|
| EAT DB (°F)             | 45   | 50   | 55   | 60   | 65   | 70   | 75   | 80   |
| HEATING CAPACITY FACTOR | 1.11 | 1.09 | 1.06 | 1.04 | 1.02 | 1.00 | 0.98 | 0.95 |
| POWER FACTOR            | 0.77 | 0.81 | 0.86 | 0.91 | 0.95 | 1.00 | 1.05 | 1.10 |
| HEAT EXTRACTION FACTOR  | 1.18 | 1.14 | 1.11 | 1.07 | 1.04 | 1.00 | 0.96 | 0.92 |

TABLE 6

| COOLING                            |    |      |      |      |      |      |
|------------------------------------|----|------|------|------|------|------|
| EAT WB (°F)                        |    | 60   | 65   | 67   | 70   | 75   |
| TOTAL CAPACITY FACTOR              |    | 0.85 | 0.96 | 1.00 | 1.06 | 1.17 |
| SENSIBLE CAPACITY FACTOR<br>EAT DB | 70 | 0.85 | 0.62 | 0.52 | -    | -    |
|                                    | 75 | 1.09 | 0.86 | 0.76 | 0.62 | -    |
|                                    | 80 | 1.33 | 1.09 | 1.00 | 0.86 | 0.63 |
|                                    | 85 | *    | 1.33 | 1.23 | 1.09 | 0.85 |
|                                    | 90 | *    | *    | *    | 1.34 | 1.10 |
| POWER FACTOR                       |    | 1.00 | 1.00 | 1.00 | 1.00 | 1.01 |
| HEAT REJECTION FACTOR              |    | 0.90 | 0.97 | 1.00 | 1.05 | 1.12 |

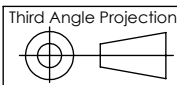
DB - DRY BULB AIR TEMPERATURE  
WB - WET BULB AIR TEMPERATURE  
EAT - ENTERING AIR TEMPERATURE  
ALL TEMPERATURES ARE IN °F  
\* = SENSIBLE CAPACITY EQUALS TOTAL CAPACITY



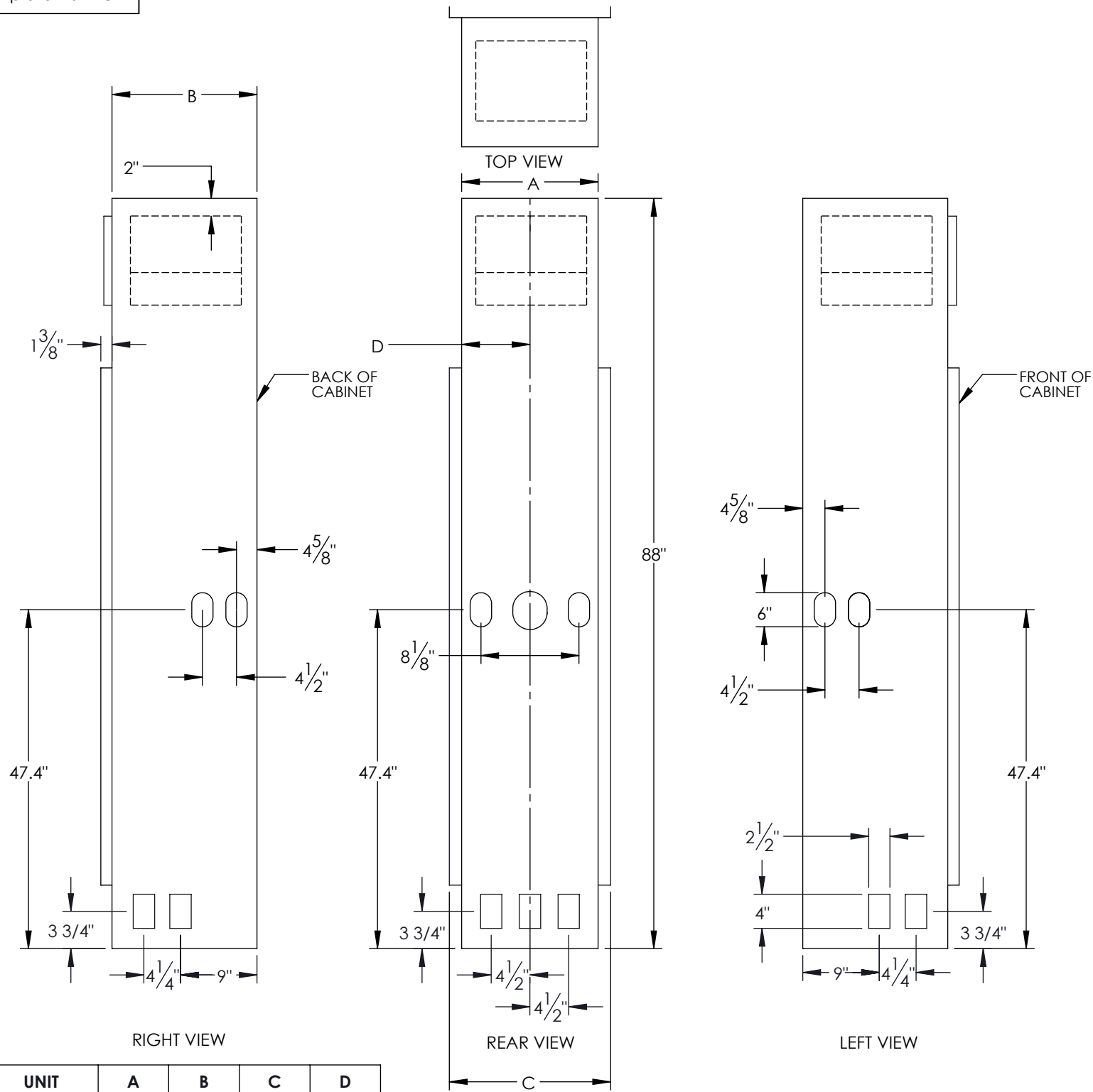
NOTE:  
RISER ARE OPTIONAL.

PER ICE-AIR'S ONGOING DEVELOPMENT PROGRAM, SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

|  |   |                                     |                            |
|--|---|-------------------------------------|----------------------------|
| MATERIAL:  | <b>ICE-AIR LLC.</b><br>80 HARTFORD AVENUE<br>MOUNT VERNON, NY 10553 |                                     |                            |
| WEIGHT (LBS):  |   |                                     |                            |
| FINISH:  | TITLE:  |                                     |                            |
| UNLESS OTHERWISE SPECIFIED:<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL $\pm 1/32$<br>ANGULAR: MACH $\pm$ ° BEND $\pm 1^\circ$<br>TWO PLACE DECIMAL $\pm .03$<br>THREE PLACE DECIMAL $\pm .015$ | MODEL BY:   | DATE:                               | DWG.NO.<br>Template VSHPGE |
|  | DRAWING BY:   | DATE:                               |                            |
|  | SIZE<br><b>A</b>  | SCALE: NONE<br>DO NOT SCALE DRAWING |                            |
|  |   |                                     | REV                        |



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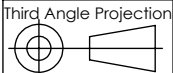
| UNIT                | A   | B   | C   | D   |
|---------------------|-----|-----|-----|-----|
| VSHPGE-09/12/15/18K | 18" | 20" | 21" | 9"  |
| VSHPGE-24/30K       | 22" | 24" | 25" | 11" |

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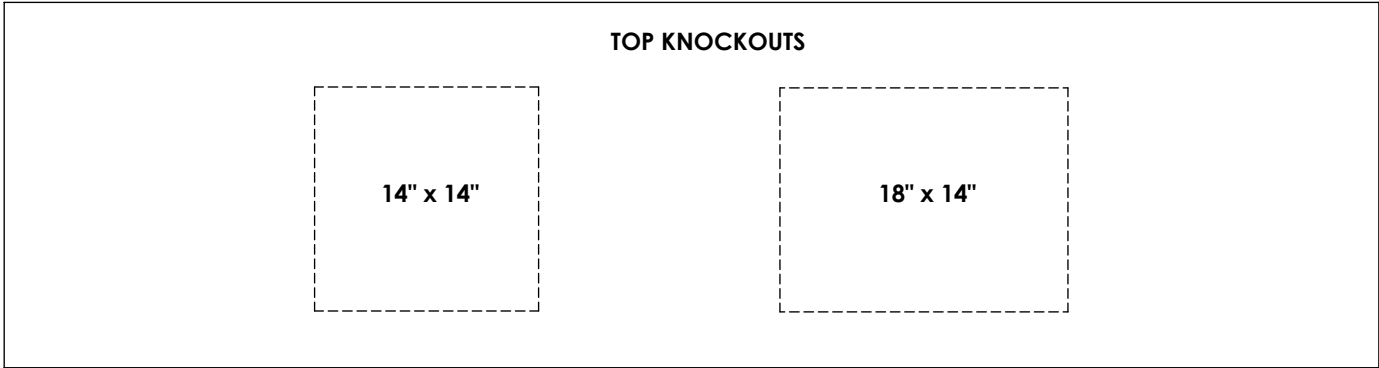
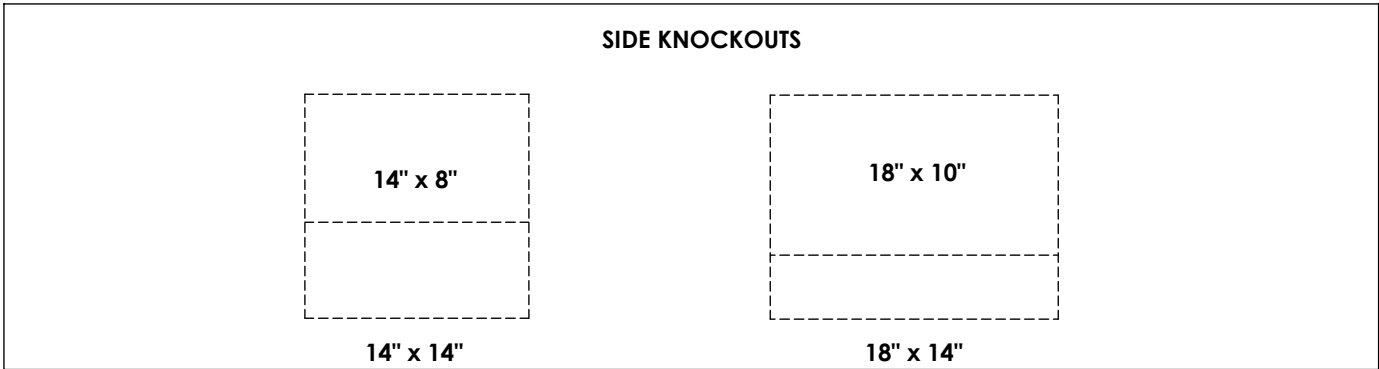
|   |   |       |                             |
|---|---|-------|-----------------------------|
| MATERIAL:   | <b>ICE-AIR LLC.</b><br>80 HARTFORD AVENUE<br>MOUNT VERNON, NY 10553 |       |                             |
| WEIGHT (LBS):   |   |       |                             |
| FINISH:   | TITLE: DIMENSIONAL DRAWING  |       |                             |
| UNLESS OTHERWISE SPECIFIED:<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL ± 1/32<br>ANGULAR: MACH ± ° BEND ± 1°<br>TWO PLACE DECIMAL ± .03<br>THREE PLACE DECIMAL ± .015 | MODEL BY:   | DATE: | DWG. NO.<br>Template VSHPGE |
|   | DRAWING BY:   | DATE: |                             |
| SIZE<br><b>A</b>  | SCALE: NONE<br>DO NOT SCALE DRAWING                                 |       | SHEET 4 OF 5                |
|   |   |       | REV                         |

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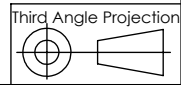


| UNIT     | SPEED | SINGLE DISCHARGE | DOUBLE DISCHARGE | TRIPLE DISCHARGE | TOP DISCHARGE |
|----------|-------|------------------|------------------|------------------|---------------|
|          |       | 14" x 14"        | 14" x 8"         | 14" x 8"         | 14" x 14"     |
| 8VSHPG09 | HIGH  | X                | X                | X                | X             |
|          | LOW   | X                | X                | X                | X             |
| 8VSHPG12 | HIGH  | X                | X                | X                | X             |
|          | LOW   | X                | X                | X                | X             |
| 8VSHPG15 | HIGH  | X                | X                | X                | X             |
|          | LOW   | X                | X                | X                | X             |
| 8VSHPG18 | HIGH  | X                | X                | X                | X             |
|          | LOW   | X                | X                | X                | X             |
| UNIT     | SPEED | SINGLE DISCHARGE | DOUBLE DISCHARGE | TRIPLE DISCHARGE | TOP DISCHARGE |
|          |       | 18" x 14"        | 18" x 10"        | 18" x 10"        | 18" x 14"     |
| 8VSHPG24 | HIGH  | X                | X                | X                | X             |
|          | LOW   | X                | X                | X                | X             |
| 8VSHPG30 | HIGH  | NR               | X                | X                | X             |
|          | LOW   | NR               | X                | X                | X             |



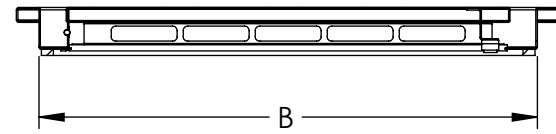
| GRILLE SIZES |
|--------------|
| 14" x 8"     |
| 14" x 14"    |
| 18" x 10"    |
| 18" x 14"    |

|   |   |                                     |                               |          |
|---|---|-------------------------------------|-------------------------------|----------|
| MATERIAL:   | <b>ICE-AIR LLC.</b><br>80 HARTFORD AVENUE<br>MOUNT VERNON, NY 10553 |                                     |                               |          |
| WEIGHT (LBS):   |   |                                     |                               |          |
| FINISH:   | TITLE: GRILLE CHART   | MODEL BY:                           | DATE:                         | DWG. NO. |
| UNLESS OTHERWISE SPECIFIED:<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL ± 1/32<br>ANGULAR: MACH ± ° BEND ± 1°<br>TWO PLACE DECIMAL ± .03<br>THREE PLACE DECIMAL ± .015 | DRAWING BY:   | DATE:                               | Submittal Template Geo VSHPGE |          |
|   | SIZE<br><b>A</b>  | SCALE: NONE<br>DO NOT SCALE DRAWING | SHEET 5 OF 5                  | REV      |

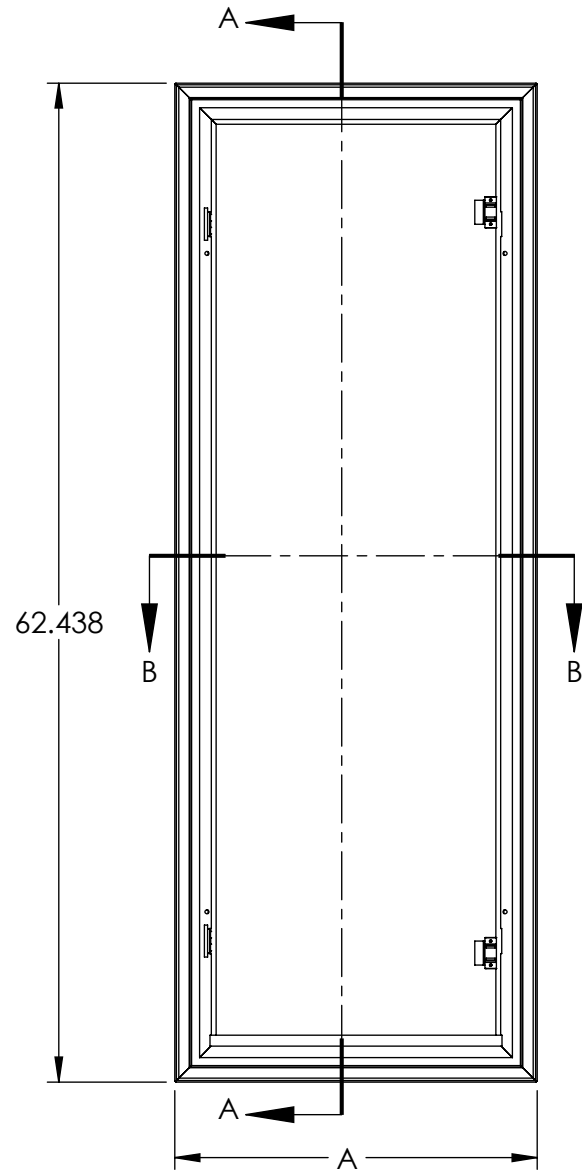


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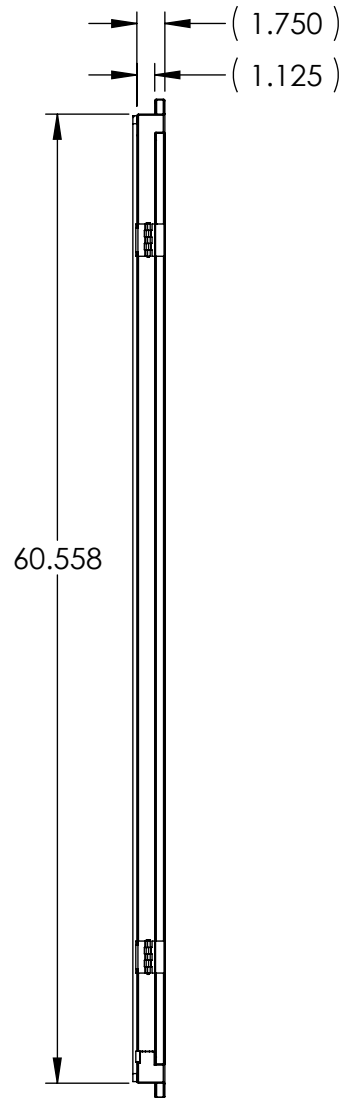
| REVISIONS |             |    |      |
|-----------|-------------|----|------|
| REV.      | DESCRIPTION | BY | DATE |



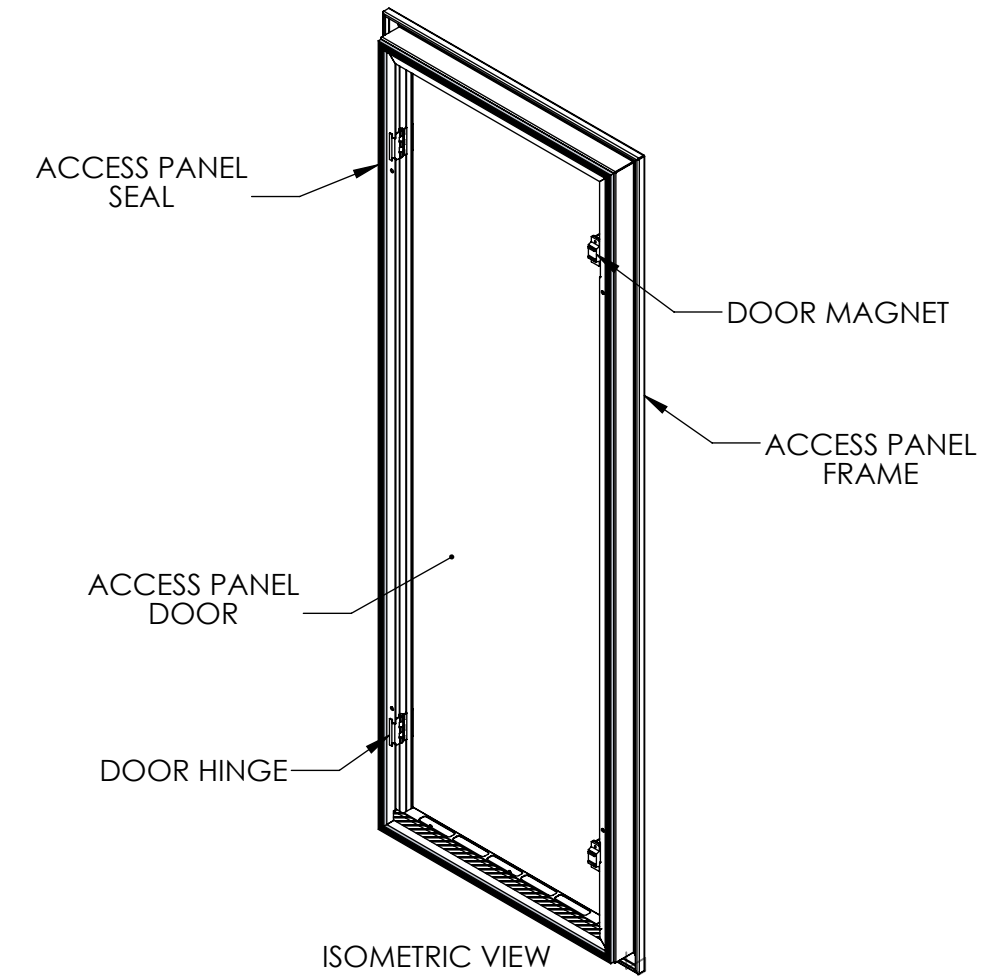
SECTION B-B  
SCALE 1 : 8



FRONT VIEW



SECTION A-A

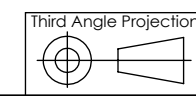


ISOMETRIC VIEW

|                 | A     | B     |
|-----------------|-------|-------|
| <b>8VSHPG09</b> | 22.65 | 20.76 |
| <b>8VSHPG12</b> | 22.65 | 20.76 |
| <b>8VSHPG15</b> | 22.65 | 20.76 |
| <b>8VSHPG18</b> | 22.65 | 20.76 |
| <b>8VSHPG24</b> | 26.65 | 24.76 |
| <b>8VSHPG30</b> | 26.65 | 24.76 |

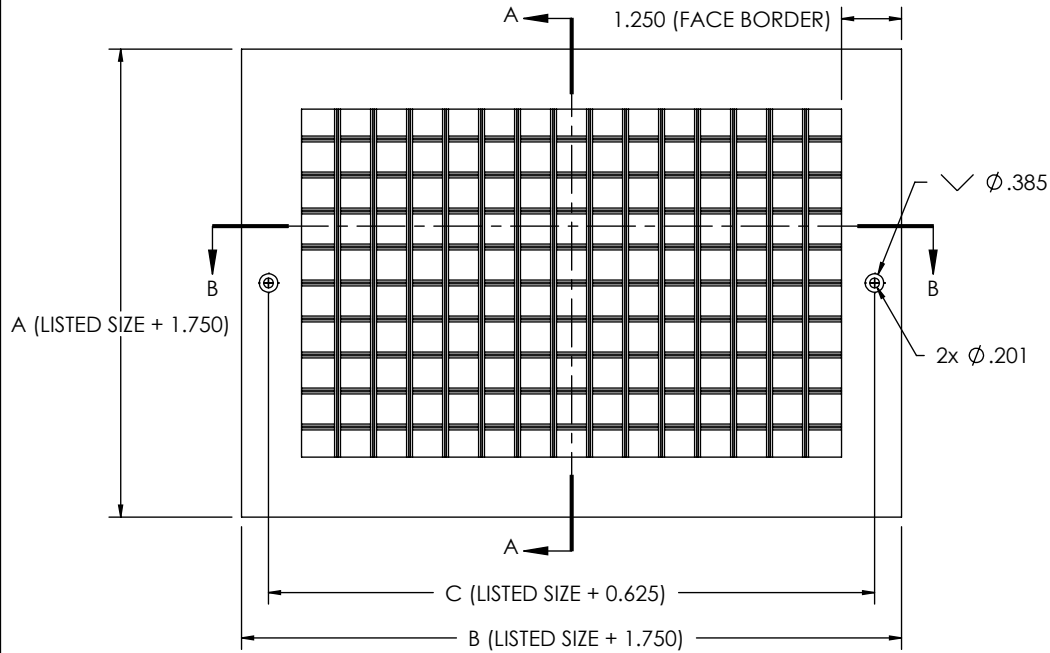
|   |   |                |          |
|---|---|----------------|----------|
| MATERIAL:   | <b>ICE-AIR LLC.</b><br>80 HARTFORD AVENUE<br>MOUNT VERNON, NY 10553 |                |          |
| WEIGHT (LBS):<br>34.82  |   |                |          |
| FINISH:<br>ANTIQUE WHITE  | TITLE: V-WSPH ACCESS PANEL WITH HINGED DOOR                         |                |          |
| UNLESS OTHERWISE SPECIFIED:<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL ± 1/32<br>ANGULAR: MACH ± ° BEND ± 1°<br>TWO PLACE DECIMAL ± .03<br>THREE PLACE DECIMAL ± .015 | MODEL BY: VP  | DATE: 08/10/11 | DWG. NO. |
|   | DRAWING BY: -   | DATE: -        | SAB-8721 |
| <b>SIZE B</b>   | SCALE: NONE<br>DO NOT SCALE DRAWING                                 | SHEET 1 OF 1   | REV      |

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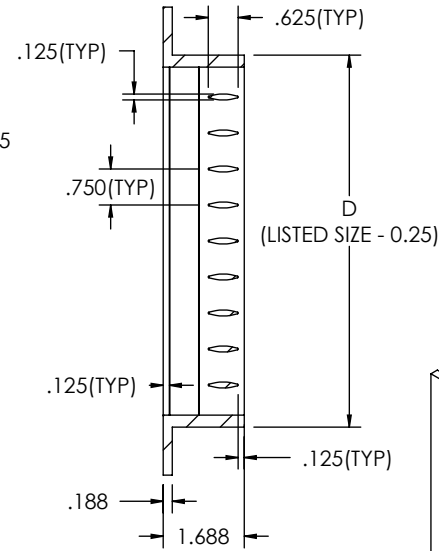


AHA-10500

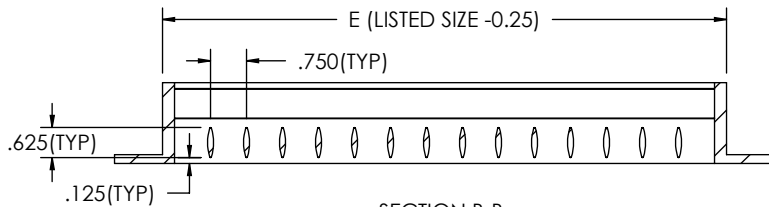
| REVISIONS |             |           |            |
|-----------|-------------|-----------|------------|
| REV.      | DESCRIPTION | BY        | DATE       |
| A         |             | pdmwadmin | 11/15/2012 |
| B         |             | VP        | 4/24/2017  |
| C         |             | pdmwadmin | 5/12/2017  |



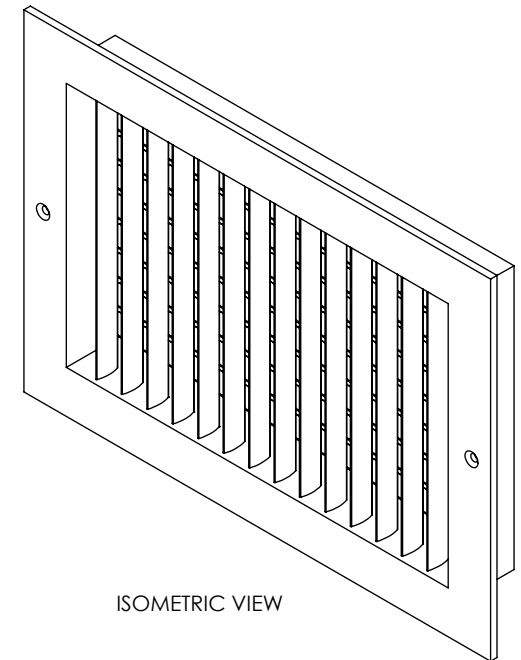
FRONT VIEW



SECTION A-A



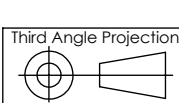
SECTION B-B



ISOMETRIC VIEW

|                       | A      | B      | C      | D      | E      |
|-----------------------|--------|--------|--------|--------|--------|
| <b>AHA-10500-0612</b> | 7.750  | 13.750 | 12.625 | 5.750  | 11.750 |
| <b>AHA-10500-0614</b> | 7.750  | 15.750 | 14.625 | 5.750  | 13.750 |
| <b>AHA-10500-0616</b> | 7.750  | 17.750 | 16.625 | 5.750  | 15.750 |
| <b>AHA-10500-0618</b> | 7.750  | 19.750 | 18.625 | 5.750  | 17.750 |
| <b>AHA-10500-0620</b> | 7.750  | 21.750 | 20.625 | 5.570  | 19.750 |
| <b>AHA-10500-0812</b> | 9.750  | 13.750 | 12.625 | 7.750  | 11.750 |
| <b>AHA-10500-0814</b> | 9.750  | 15.750 | 14.625 | 7.750  | 13.750 |
| <b>AHA-10500-0820</b> | 9.750  | 21.750 | 20.625 | 7.750  | 19.750 |
| <b>AHA-10500-1018</b> | 11.750 | 19.750 | 18.625 | 9.750  | 17.750 |
| <b>AHA-10500-1212</b> | 13.750 | 13.750 | 12.625 | 11.750 | 11.750 |
| <b>AHA-10500-1414</b> | 15.750 | 15.750 | 14.625 | 13.750 | 13.750 |
| <b>AHA-10500-1418</b> | 15.750 | 19.750 | 18.625 | 13.750 | 17.750 |

|   |   |                |                              |                 |
|---|---|----------------|------------------------------|-----------------|
| MATERIAL:   | <b>ICE-AIR LLC.</b><br>80 HARTFORD AVENUE<br>MOUNT VERNON, NY 10553 |                |                              |                 |
| WEIGHT (LBS):<br>1.245  |   |                |                              |                 |
| FINISH:<br>N/A  | TITLE: <b>STEEL DOUBLE DEFLECTION GRILLE</b>                        |                |                              |                 |
| UNLESS OTHERWISE SPECIFIED:<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL ± 1/32<br>ANGULAR: MACH ± ° BEND ± 1°<br>TWO PLACE DECIMAL ± .03<br>THREE PLACE DECIMAL ± .015 | MODEL BY: VP  | DATE: 11/12/12 | DWG. NO.<br><b>AHA-10500</b> |                 |
|   | DRAWING BY: -   | DATE: -        |                              |                 |
| <b>A</b>  | SCALE: NONE<br>DO NOT SCALE DRAWING                                 | SHEET 1 OF 1   |                              | REV<br><b>C</b> |



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**VERTICAL STACK, MODEL “8VSHPG” SIZE 09-30**  
**GEOHERMAL HEAT PUMP SPECIFICATIONS**

**General:**

Furnish and install Ice Air Geothermal Heat Pump A/C, as indicated on the plans with capacities and characteristics as listed in the schedule and the specifications that follow.

**Vertical Stack Geothermal Heat Pump A/C:**

Units shall operate in range 20° to 100°F entering fluid temperature. All equipment listed in this section must be rated in accordance with American Refrigeration Institute / International Standards Organization (ARI / ISO) and Environmental Testing Laboratories for United States and Canada (ETL-US-C). The units shall have ETL-US-C labels. All cabinets and chassis shall be factory tested under normal operating and water flow rates.

**Basic Construction:**

The cabinet panels shall be fabricated from heavy gauge galvanized steel. Cabinet shall be constructed so that it is self-supporting, and can be installed before chassis arrival. Top, base, and exterior panels are to be 16 gauge. The fan deck is 12 gauge. Cabinet shall have a top panel and a bottom panel for structural rigidity of the cabinet; no “open” top or “open” bottom designs allowed.

The cabinet base shall contain a P-trap connected to the condensate riser pipe, and guide rails to support and align the slide-in refrigeration chassis. Drain pan(s) shall be easily accessible for cleaning. All interior surfaces shall be lined with 1/2 inch (12.7mm) thick, dual density 1-3/4 lb/ft<sup>3</sup> (28 kg/m<sup>3</sup>) acoustic type fiberglass insulation. All fiberglass shall be coated to prevent the introduction of glass fibers into the air stream.

Standard cabinet panel insulation must meet NFPA 90A requirements, air erosion and mold growth limits of UL-181, stringent fungal resistance test per ASTM-C1071 and ASTM G21, and shall meet zero level bacteria growth per ASTM G22.

Cabinet arrangements shall allow placement of riser piping on any of the three sides of the cabinet not used for the chassis access. All Cabinets will have front discharge opening along with knockouts on 3 sides and the top. For air noise attenuation purposes, the discharge air from fan shall discharge into an insulated plenum that also contains insulated air baffles at all cabinet supply air openings. The cabinet shall contain an easily removable motor/blower assembly.

**Fan and Motor Assembly:**

The cabinet shall contain a removable motor/blower assembly. Units shall have a direct-drive centrifugal fan. The fan motor shall be 2-speed cooling/2 speed heating, permanently lubricated, ECM type with thermal overload protection. The fan motor shall be isolated from the fan housing by a torsionally flexible motor mounting system with rubber type grommets to inhibit vibration-induced high noise levels associated with “hard wire belly band” motor mounting.

Airflow/External static pressure rating of the unit shall be based on a wet coil and clean filter.

Fan deck is designed to slide out from the front, after the chassis is removed.



**Chassis:**

The chassis, which incorporates the air coil, drain pan, compressor, and coaxial condenser coil shall be an easily installed, slide-in type for quick jobsite installation and future servicing purposes. The slide-in chassis shall have an insulated panel separating the fan compartment from the compressor compartment. Compressors are not in the air stream. The chassis base shall be fabricated from heavy gauge galvanized steel formed to match the slide-in rails of the cabinet. All electrical connections between the chassis and cabinet shall be made via locking Molex type connectors. Units shall have a factory installed 1-inch (25.4mm) thick filter bracket and throwaway type glass fiber filter.

Water connections between chassis and the cabinet shall be accomplished via a hose kit with a stainless-steel braid. Hose kit shall have brass fittings with stainless-steel ferrules. Hose ends shall be solid External NPT which connects to mating fitting on cabinet shut off ball valve(s), and Internal NPSM (National Pipe Straight Mechanical) swivel end with fiber or EPDM washer which connects to mating threaded end connection on chassis. The hose kit shall be rated for 350 psi (2412 kPa) design working pressure.

**Valve Package:**

All chassis will have a factory installed valve package. The valve package consists of a 2-way normally closed motorized valve and 1- auto flow valve.

**Refrigerant Circuit:**

All units shall contain an HFC 410A sealed refrigerant circuit including a high efficiency scroll or rotary compressor designed for heat pump operation, an enhanced corrugated aluminum lanced fin and rifled copper tube refrigerant-to-air heat exchanger, reversing valve, coaxial (tube in tube) refrigerant-to-water heat exchanger, and safety controls including a high pressure switch, low pressure switch (loss of charge), water coil low temperature sensor, and air coil low temperature sensor. Access fittings shall be factory installed on high and low pressure refrigerant lines to facilitate field service. Activation of any safety device shall prevent compressor operation via a microprocessor lockout circuit.

Hermetic compressors shall be internally sprung and externally isolated. The compressor shall have an external, dual level vibration isolation system. The compressor will be mounted on rubber grommets to a large heavy gauge compressor mounting tray plate, which is then isolated from the cabinet base with vibration isolators for maximized vibration attenuation. Compressor shall have thermal overload protection.

Refrigerant-to-air heat exchanger shall utilize enhanced corrugated lanced aluminum fins and rifled copper tube construction. Refrigerant-to-water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design. The refrigerant-to-water heat exchanger shall be "electro-coated" with a low cure cathodic epoxy material a minimum of 0.4 mils thick (0.4 – 1.5 mils range) on all surfaces.

Coaxial (tube in tube) refrigerant-to-water heat exchanger shall be coated with epoxy corrosion protection paint and insulated.

All water pipes and coaxial coil shall be insulated with R2 minimum closed cell insulation.

**Cabinet Drain Pan:**

The drain pan shall be constructed of galvanized steel and have a powder coat paint application to further inhibit corrosion. This corrosion protection system shall meet the stringent 1000 hour salt spray test per ASTM B117. Drain pan shall have at a minimum a doubled sloped surface to allow positive drainage to the outlet opening, which shall be at the lowest level of the entire pan surface. Drain outlet shall be connected from pan outlet to condensate riser with factory installed P-trap hose inside the cabinet. The unit as standard will be supplied with solid-state electronic condensate overflow protection.

**Electrical:**

A control box shall be located on the chassis and shall contain a 25VA transformer, 24 volt activated compressor relay, terminal block for thermostat wiring and solid-state controller for unit operation. Reversing valve and fan motor wiring shall be routed through this electronic controller. Units shall be name-plated for use with time delay fuses or HACR circuit breakers. Unit controls shall be 24 Volts and provide heating or cooling as required by the remote thermostat / sensor.

**Solid State Control System:**

Units shall have a solid-state control system. The control system shall interface with a heat pump type thermostat. The control system shall have the following features:

- a. Anti-short cycle time delay on compressor operation.
- b. Random start on power up mode.
- c. Low voltage protection.
- d. High voltage protection.
- e. Unit shutdown on high or low refrigerant pressures.
- f. Unit shutdown on low water temperature.
- g. Condensate overflow electronic protection.
- h. Automatic intelligent reset. Unit shall automatically reset 5 minutes after trip if the fault has cleared. If a fault occurs 3 times sequentially without thermostat meeting temperature, then lockout requiring manual reset will occur.
- i. Ability to disable time delays for servicing.
- j. Light emitting diodes (LEDs) on circuit board to indicate high pressure, low pressure, low voltage, high voltage, low water/air temperature cut-out, condensate overflow, and control voltage status.
- k. The low-pressure switch shall not be monitored for the first 120 seconds after a compressor start command to prevent nuisance safety trips.
- l. 24V output to cycle a motorized water valve or other device with compressor contactor.
- m. Water coil low temperature sensing (selectable for water or anti-freeze).
- n. Air coil low temperature sensing.

**Supply Grilles:**

Supply grille(s) shall be architecturally designed powder coated steel.

**Front/Return panel:**

The return panel shall be architecturally designed, acoustic type, flush mounted panel with hinged door for easy and quick access to filter and unit interior. Chassis shall be easily removable without removing return panel. The hinged return panel shall be made of heavy gauge die formed galvanized steel with a powder coat finish.

**Warranty:**

Ice Air shall warranty equipment for a period of 12 months from start up. Standard warranty covers replacement of defective parts, with optional warranty add-ons for labor coverage and extended warranty periods. 2<sup>nd</sup> through 5<sup>th</sup> year compressor parts only warranty to be provided also.

**FIELD INSTALLED OPTIONS****Thermostats:**

The thermostat shall be a Ice Air electronic type thermostat as selected below with the described features:

**Single Stage Auto Changeover Programmable 7 or 5/2 Day**

Thermostat shall be 7 or 5 day/2 day programmable (with up to 4 set points per day), single stage (2H/2C), manual changeover with HEAT-OFF-COOL system settings and fan ON-AUTO settings. Thermostat shall have an LCD display with temperature, set-point(s), mode, and status indication. The temperature indication shall be selectable for °F or °C. The thermostat shall provide permanent memory of set-point(s) without batteries. Thermostat shall provide convenient override feature to temporarily change set point.