

HORIZONTAL WATER SOURCE HEAT PUMP (HHPW) CERTIFIED DRAWING

DWG. NO. **Submittal Template HHPW 1_24_19**
REV. -

PROJECT	DATE	BY	REVISIONS			
PURCHASER	P.O. #	QTY	DATE	BY	DESCRIPTION	
ARCHITECT	SHIPPING DATES					
ENGINEER						
HVAC CONTR.						
GEN. CONTR.						

DESIGNATION	MODEL NUMBER	QTY
TOTAL		

GENERAL NOTES

- 1: PROVIDE UNITS WITH R410A GREEN REFRIGERANT
- 2: PROVIDE 7/8" WASHABLE FILTERS
- 3: PROVIDE OVERFLOW CONDENSATE SWITCH
- 4: PROVIDE STANDARD UNIT-MOUNTED DIGITAL CONTROL BOARD

OPTIONAL

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

CUSTOM NOTES

- 1:

UNIT SPECIFICATIONS+

Cooling												
3GPM/Ton @ 86F EWT	8HHPW09	8HHPW12	8HHPW15	8HHPW18	8HHPW24	8HHPW30	8HHPW36	8HHPW42	8HHPW48	8HHPW60	8HHPW70	
Total Capacity	BtuH	9,300	12,200	14,900	19,500	23,500	29,100	35,000	41,500	48,300	60,000	67,000
Airflow	CFM	300	400	500	600	800	1,000	1,200	1,400	1,600	2,000	2,400
Flow Rate	GPM	2.3	3	3.8	4.5	6	7.5	9	10.5	12	15	17.5
EER w/ PSC		14	13.5	14.3	14	14.4	14.5	15	14.2	13.8	14.2	14
WPD (PSI)		3.1	2.8	4.4	3.9	6.4	6.5	4.6	6.3	8.3	7.7	10.3
Heating												
3GPM/Ton @ 68F EWT	8HHPW09	8HHPW12	8HHPW15	8HHPW18	8HHPW24	8HHPW30	8HHPW36	8HHPW42	8HHPW48	8HHPW60	8HHPW70	
Total	BtuH	11,000	14,500	17,200	22,000	29,500	35,500	42,000	46,500	55,000	71,500	77,000
COP		4.8	4.5	4.5	4.8	4.8	4.7	4.7	4.6	4.4	4.6	4.5

TABLE 1

COOLING CAPACITY RATED @ 80.6°F DB, 66.2°F WB EAT; 86°F EWT
HEATING CAPACITY RATED @ 68°F DB, 59°F WB EAT; 68°F EWT

PHYSICAL DATA												
MODEL	8HHPW09	8HHPW12	8HHPW15	8HHPW18	8HHPW24	8HHPW30	8HHPW36	8HHPW42	8HHPW48	8HHPW60	8HHPW70	
COMPRESSOR TYPE(1 PER)	ROTARY						SCROLL					
REFRIGERANT TYPE	R410A											
REFRIGERANT FACTORY CHARGE (OZ)	18	20	25	32	37	42	43	47	54	64	71	
BLOWER WHEEL SIZE(DIA X W)	6x6	7x7		8x8			9x7			10x10		
STANDARD FILTER 7/8"	21.25x10.75		25.25x15.75		25.25x16.75		27.25x18.75		44.25x21.75			
UNIT WEIGHT(LB)	130	140	180	220	280	300	310	320	330	350	380	
WATER CONNECTION (SUPPLY/RETURN)	1/2" F NPT	1/2" F NPT	1/2" F NPT	3/4" F NPT	3/4" F NPT	3/4" F NPT	3/4" F NPT	3/4" F NPT	3/4" F NPT	3/4" F NPT	3/4" F NPT	3/4" F NPT
CONDENSATE CONNECTION(IN)	3/4" F NPT	3/4" F NPT	3/4" F NPT	3/4" F NPT	3/4" F NPT	3/4" F NPT	3/4" F NPT	3/4" F NPT	3/4" F NPT	3/4" F NPT	3/4" F NPT	3/4" F NPT

TABLE 2

HORIZONTAL WATER SOURCE HEAT PUMP (HHPW) CERTIFIED DRAWING

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ENGINEER						
HVAC CONTR.						
GEN. CONTR.						

UNIT SPECIFICATIONS+

ELECTRICAL DATA

MODEL	VOLTAGE/HZ-PHASE	COMPRESSOR RLA	COMPRESSOR LRA	FAN MOTOR FLA	TOTAL UNIT FLA	MINIMUM CIRCUIT AMPS	MAX FUSE /HACR
8HHPW09	208-230/60-1	4.7	22.2	1.0	5.7	7.1	15
8HHPW12	208-230/60-1	5.1	32.5	1.0	6.1	7.6	15
8HHPW15	208-230/60-1	7.7	44	1.2	8.9	11.1	15
8HHPW18	208-230/60-1	13.5	58	1.8	15.3	19.1	30
8HHPW24	208-230/60-1	14.3	64	2.2	16.5	20.6	30
8HHPW30	208-230/60-1	15.1	73.0	3.0	18.1	22.6	35
8HHPW36	208-230/60-1	16.7	79.0	3.0	19.7	24.6	40
8HHPW42	208-230/60-1	17.9	112.0	3.0	20.9	26.1	40
8HHPW48	208-230/60-1	19.3	118	3.4	22.7	28.4	45
8HHPW60	208-230/60-1	21	124	4.9	25.9	32.4	50
8HHPW70	208-230/60-1	22	140	4.9	26.9	33.6	50

TABLE 3

AIR FLOW CORRECTION TABLE

	% 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

TABLE 4

AIR TEMPERATURE CORRECTION TABLE

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 5

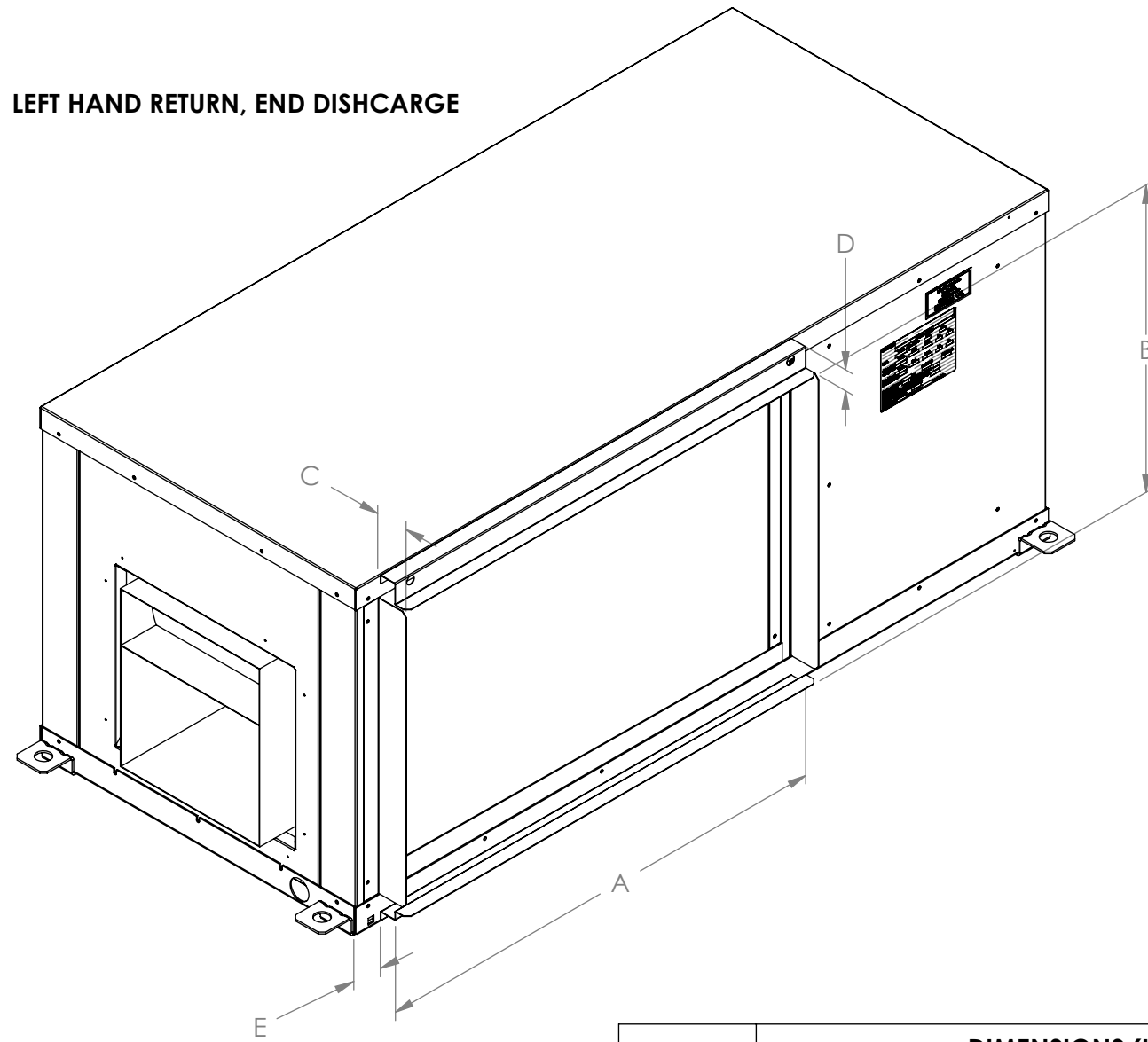
COOLING					
EAT WB (°F)	60	65	67	70	75
TOTAL CAPACITY FACTOR	0.85	0.96	1.00	1.06	1.17
SENSIBLE CAPACITY FACTOR EAT DB	70	0.85	0.62	0.52	-
	75	1.09	0.86	0.76	0.62
	80	1.33	1.09	1.00	0.86
	85	*	1.33	1.23	1.09
	90	*	*	1.48	1.34
95	*	*	*	1.56	
POWER FACTOR	1.00	1.00	1.00	1.00	1.01
HEAT REJECTION FACTOR	0.90	0.97	1.00	1.05	1.12

TABLE 6

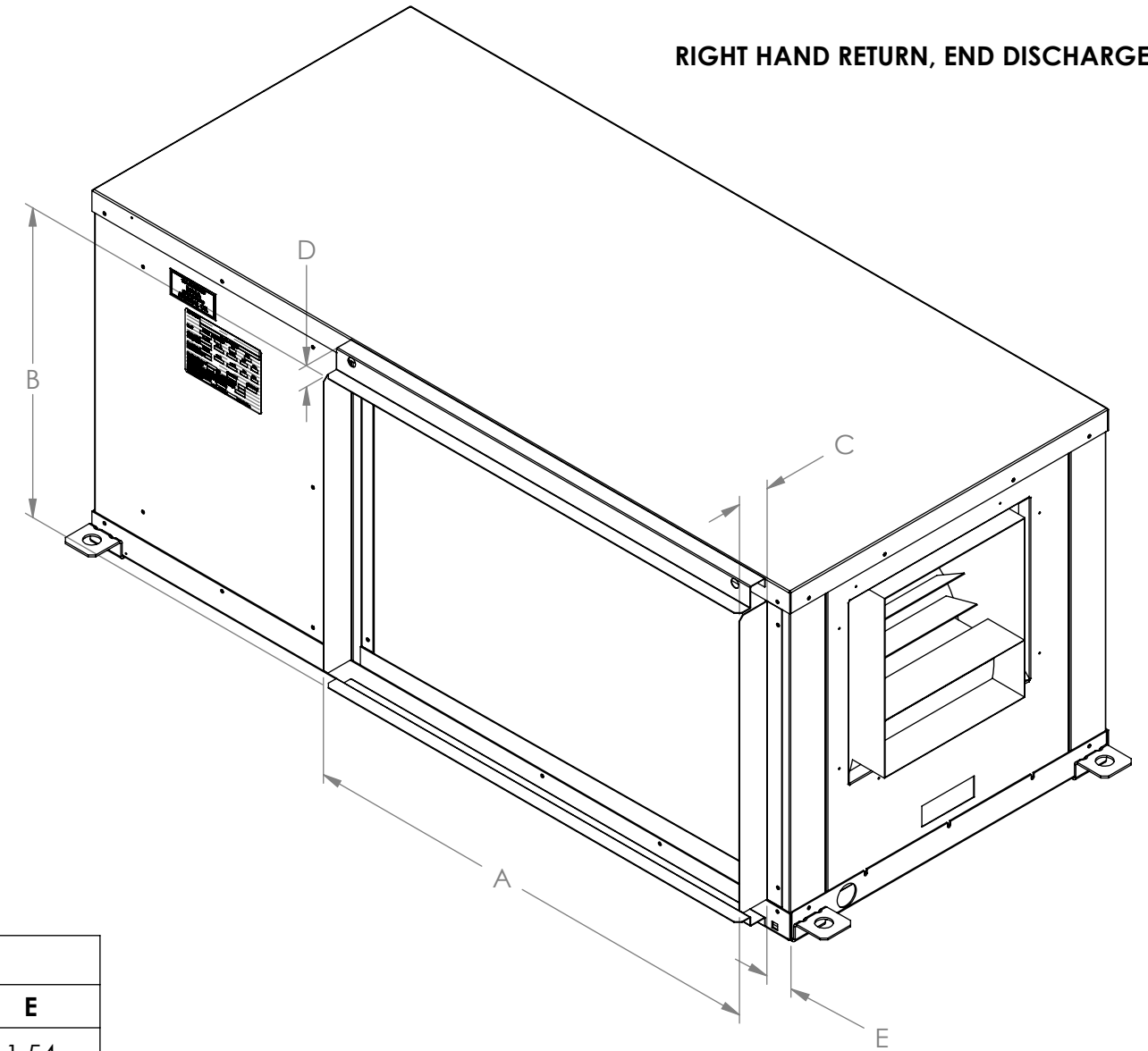
DB - DRY BULB AIR TEMPERATURE
WB - WET BULB AIR TEMPERATURE
EAT - ENTERING AIR TEMPERATURE
ALL TEMPERATURES ARE IN °F
* = SENSIBLE CAPACITY EQUALS TOTAL CAPACITY

REVISIONS			
REV.	DESCRIPTION	BY	DATE
F	PART OF CHART DIMENSIONS CHANGED		1/18/2018
G	CHART DIMENSIONS CHANGED		1/25/2018
H	P.2 CHART DIMENSIONS CHANGED		2/8/2018

LEFT HAND RETURN, END DISCHARGE



RIGHT HAND RETURN, END DISCHARGE

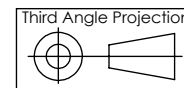


UNIT SIZE	DIMENSIONS (INCHES)				
	A	B	C	D	E
09,12	21.41	9.62	1.83	1.20	1.54
15,19	25.42	14.68	1.83	1.20	1.54
24, 30	25.42	15.85	1.83	1.20	1.54
36, 42	27.42	17.68	1.83	1.20	1.54
48,60,70	44.41	20.68	1.83	1.20	1.54

NOTE.
FILTER RACK/RETURN AIR DUCT COLLAR.

MATERIAL:	ICE-AIR LLC. 80 HARTFORD AVENUE MOUNT VERNON, NY 10553		
WEIGHT (LBS): 115.86			
FINISH: N/A	TITLE: HORIZONTAL WATER SOURCE HEAT PUMP SUBMITTAL DRAWING		
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± 1/32 ANGULAR: MACH ± ° BEND ± 1° TWO PLACE DECIMAL ± .03 THREE PLACE DECIMAL ± .015	MODEL BY: VP	DATE: 07/15/10	DWG. NO.
	DRAWING BY: -	DATE: -	SUB-8610
SIZE B	SCALE: NONE DO NOT SCALE DRAWING	SHEET 1 OF 2	REV H

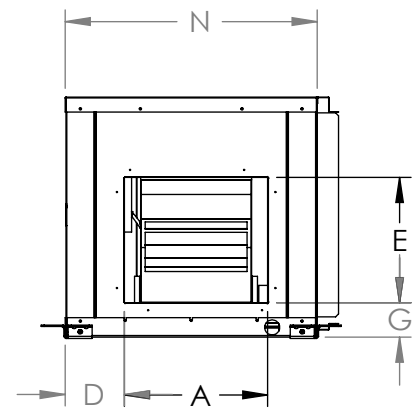
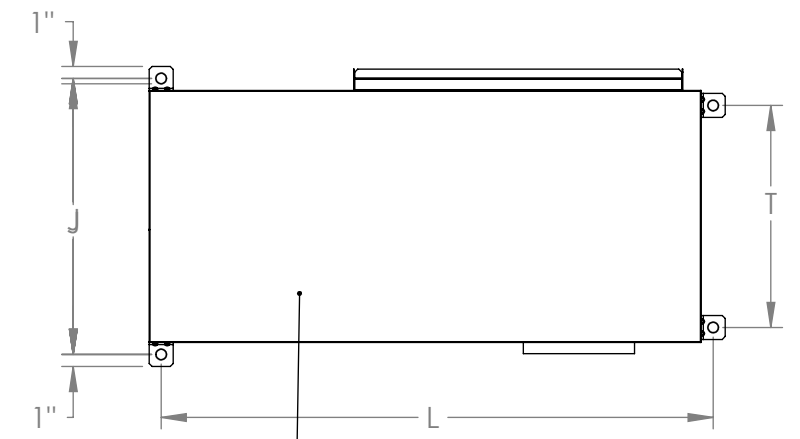
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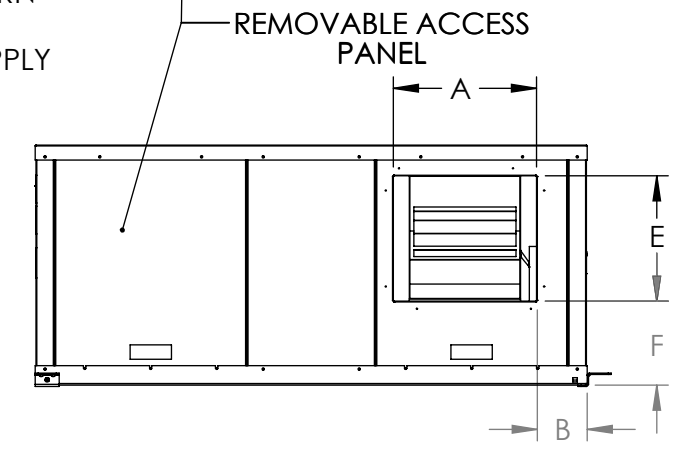
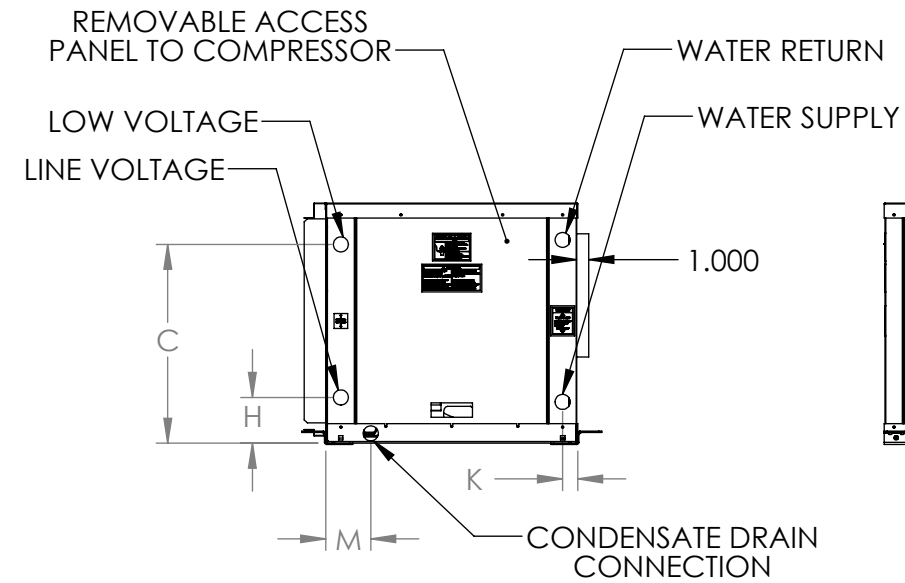
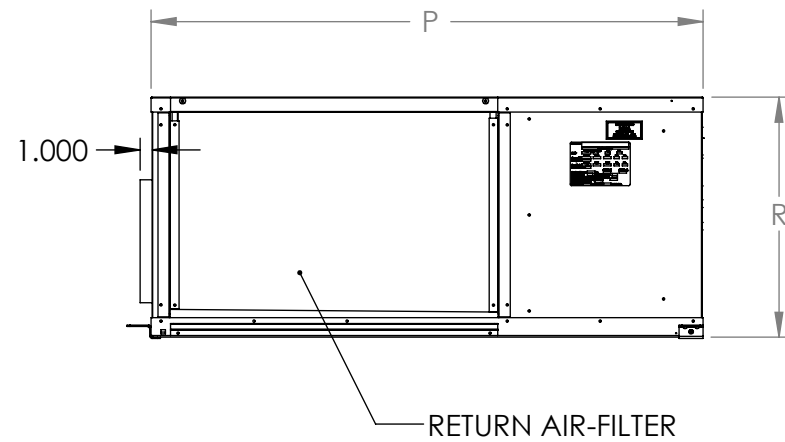
DIMENSIONAL DATA: END AND STRAIGHT DISCHARGE

PHYSICAL DATA

UNIT SIZE	09,12	15,19	24, 30	36, 42	48,60,70
OVERALL UNIT DIMENSIONS	20"Wx34"Lx12"H	20"Wx42"Lx17"H	20"Wx42"Lx18 1/4"H	21"Wx46"Lx20"H	28"Wx52"Lx23"H
WATER CONNECTIONS, FPT	1/2	1/2	3/4	3/4	3/4
CONDENSATE CONNECTION, FPT	3/4	3/4	3/4	3/4	3/4



END DISCHARGE VIEW



STRAIGHT DISCHARGE VIEW

DIMENSIONAL DATA (IN INCHES)

UNIT SIZE	DIMENSIONS															
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	T
09,12	9.6	4.7	8.5	4.8	4.8	1.8	1.8	4.6	22	1.3	34	3.8	20	34	12	17.5
15,19	9.1	2.5	14.0	3.4	8.3	6.7	2.0	3.5	22	1.3	42	3.8	20	42	17	17.5
24,30	11.3	1.8	15.2	2.7	10.1	5.5	2.7	3.5	22	1.3	42	3.8	20	42	18.25	17.5
36,42	9.3	2.3	17.0	3.2	10.3	6.1	4.0	3.5	23	1.3	46	3.8	21	46	20	18.5
48,60,70	13.0	5.3	20.0	5.8	11.5	9.0	2.0	3.5	30	1.3	52	3.8	28	52	23	25.5

NOTE.

1. RIGHT AND LEFT HAND RETURN DETERMINED BY FACING THE WATER CONNECTION SIDE OF THE UNIT.
2. BLOWER HOUSING ASSEMBLY CONVERTS FROM STRAIGHT DISCHARGE TO END DISCHARGE.
3. LEFT HAND RETURN SHOWN. RIGHT HAND RETURN OPTIONAL.

MATERIAL:

WEIGHT (LBS):
115.86

FINISH:
N/A

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ± 1/32
ANGULAR: MACH ± ° BEND ± 1°
TWO PLACE DECIMAL ± .03
THREE PLACE DECIMAL ± .015

ICE-AIR LLC.
80 HARTFORD AVENUE
MOUNT VERNON, NY 10553

TITLE: HORIZONTAL WATER SOURCE HEAT PUMP
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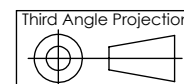
MODEL BY: VP DATE: 07/15/10 DWG. NO. SUB-8610
DRAWING BY: - DATE: -

SIZE B

SCALE: NONE
DO NOT SCALE DRAWING

SHEET 2 OF 2

REV H



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Ice Air
“HHPW” SIZE 07-70 60 Hz
ENGINEERING SPECIFICATIONS

General:

Furnish and install Ice Air “HHPW” Water Source Heat Pumps, as indicated on the plans. Equipment shall be completely assembled, piped, and internally wired. Capacities and characteristics as listed in the schedule and the specifications that follow.

Units shall be supplied completely factory built capable of operating over an entering water temperature range from 60° to 120°F as standard. Equivalent units from other manufacturers may be proposed provided approval to bid is given 10 days prior to bid closing. All equipment must be tested, investigated, and determined to comply with the requirements of the standards for Heating and Cooling Equipment UL-1995 for the United States and CAN/CSA-C22.2 NO.236 for Canada, by Intertek Testing Laboratories (ETL). The units shall have ETL-US-C labels.

All units shall be fully quality tested by factory run testing under normal operating conditions as described herein. Quality control system shall automatically perform via computer: triple leak check, pressure tests, evacuation and accurately charge system, perform detailed heating and cooling mode tests, and quality cross check all operational and test conditions to pass/fail criteria.

Basic Construction:

Horizontal units shall have one of the following air flow arrangements: Left Inlet/Straight (Right) Discharge; Right Inlet/Straight (Left) Discharge; Left Inlet/Back Discharge; or Right Inlet/Back Discharge as shown on the plans. Horizontal units will have factory installed hanger brackets with rubber isolation grommets packaged separately.

If units with these arrangements are not used, the contractor is responsible for any extra costs incurred by other trades. All units must have a minimum of three access panels for serviceability of compressor compartment. ***Units having only one access panel to compressor/heat exchangers/expansion device/refrigerant piping shall not be acceptable.***

Compressor section interior surfaces shall be lined with 1/2 in (12.7mm) thick, 1-1/2 lb/ft³ (24 kg/m³) acoustic type glass fiber insulation. Air handling section interior surfaces shall be lined with 1/2 in (12.7mm) thick, 1-1/2 lb/ft³ (24 kg/m³) fiber insulation. Insulation placement shall be designed in a manner that will eliminate any exposed edges to prevent the introduction of glass fibers into the air stream.

The heat pumps shall be fabricated from heavy gauge galvanized steel.

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. ***Unit insulation must meet these stringent requirements or unit(s) will not be accepted.***

All horizontal units to have factory installed 1”(25.4mm) discharge air duct collars, 1”(25.4mm) filter rails with 1”(25.4mm) filters factory installed, and factory installed unit-mounting brackets. ***If units with these factory-installed provisions are not used, the contractor is responsible for any extra costs to field install these provisions, and/or the extra costs for his sub-contractor to install these provisions.***

All units must have an insulated panel separating the fan compartment from the compressor compartment. Units with the compressor in the air stream are not acceptable. Units shall have a factory installed 1 inch (25.4mm) wide filter bracket for filter removal from either side. Units shall have a 1 inch (25.4mm) thick throwaway type glass fiber filter. The contractor shall purchase one spare set of filters and replace factory shipped filters on completion of start-up. Filters shall be standard sizes.

Cabinets shall have separate holes and knockouts for entrance of line voltage and low voltage control wiring. All factory-installed wiring passing through factory knockouts and openings shall be protected from sheet metal edges at openings by plastic ferrules. Supply and return water connections shall be copper FPT fittings, and shall be securely mounted flush to the cabinet corner post allowing for connection to a flexible hose without the use of a back-up wrench. Water connections that protrude through the cabinet or require the use of a backup wrench shall not be allowed. All water connections and electrical knockouts must be in the compressor compartment corner post as to not interfere with the serviceability of unit. Contractor shall be responsible for any extra costs involved in the installation of units that do not have this feature. Contractor must ensure that units can be easily removed for servicing and coordinate locations of electrical conduit and lights with the electrical contractor.

Option: Contractor shall install 2-inch (50.8mm) filter racks with removable access door and 2 inch (50.8mm) MERV11 pleated throwaway filters on all units.

Option: The unit will be supplied with internally factory mounted automatic water flow regulators.

Option: The unit shall be supplied with extended range insulation option, which adds closed cell insulation to internal water lines, and provides insulation on suction side refrigeration tubing including refrigerant to water heat exchanger.

Fan and Motor Assembly:

Units shall have a direct-drive centrifugal fan. The fan motor shall be a PSC ball bearing type motor or ECM. The fan motor shall be isolated from the housing by rubber grommets. The motor shall be permanently lubricated and have thermal overload protection. Airflow/Static pressure rating of the unit shall be based on a wet coil and a clean filter in place. ***Ratings based on a dry coil, and/or no air filter, shall NOT be acceptable.***

Refrigerant Circuit:

All units shall contain a HFC-410A sealed refrigerant circuit including a compressor designed for heat pump operation, capillary tubing for refrigerant metering, an enhanced corrugated aluminium 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. Activation of any safety device shall prevent compressor operation via a microprocessor lockout circuit. The lockout circuit shall be reset at the thermostat or at the contractor supplied disconnect switch. ***Units that cannot be reset at the thermostat shall not be acceptable.***

Hermetic compressors shall be internally sprung. The compressor will be mounted on specially engineered sound-tested EPDM vibration isolation grommets to a large heavy gauge compressor mounting plate. Compressor shall have thermal overload protection. Compressor shall be located in an insulated compartment away from air stream to minimize sound transmission.

Refrigerant to air heat exchangers shall utilize enhanced corrugated lanced aluminum fins and rifled copper tube construction rated to withstand 609 PSIG (4198 kPa) refrigerant working pressure. Refrigerant to water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design, rated to withstand 609 PSIG (4198 kPa) working refrigerant pressure and 300 PSIG (2068 kPa) working water pressure.

Reversing valve shall be four-way solenoid activated refrigerant valve, which shall default to heating mode should the solenoid fail to function

Drain Pan:

The drain pan shall be constructed of powder coated steel. Drain outlet shall be located at pan as to allow complete and unobstructed drainage of condensate. The unit as standard will be supplied with solid-state electronic condensate overflow protection. ***Mechanical float switches will NOT be accepted.***

Electrical:

A control box shall be located within the unit compressor compartment and shall contain a 40VA

transformer, relay or contactor, terminal block for thermostat wiring and solid-state controller for complete 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 Volt and provide heating or cooling as required by the remote thermostat/sensor.

Option: Units shall be supplied with factory installed non-fused electrical service disconnect switch.

Solid State Control System:

Units shall have a solid-state control system. ***Units utilizing electro-mechanical control shall not be acceptable.*** The control system microprocessor board shall be specifically designed to protect against building electrical system noise contamination, EMI, and RFI interference. 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. Option to reset unit at thermostat or disconnect.
- k. Light emitting diode (LED) 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.
- l. The low-pressure switch shall not be monitored for the first 120 seconds after a compressor start command to prevent nuisance safety trips.
- o. Water coil low temperature sensing (selectable for water or anti-freeze).
- p. Air coil low temperature sensing.

NOTE: Units not providing these safety protections of anti-short cycle, low voltage, high voltage, high refrigerant pressure, low pressure (loss of charge), air coil low temperature cut-out, water coil low temperature cut-out, and condensate overflow protections will not be accepted.

Warranty:

Ice Air shall warranty equipment for a period of 12 months from start up or 18 months from shipping (which ever occurs first).

Option: Extended 4-year compressor warranty covers compressor for a total of 5 years.

FIELD INSTALLED OPTIONS

Hose Kits:

All units shall be connected with hoses. The hoses shall be 2 feet (61cm) long, braided stainless steel; fire rated hoses complete with adapters. Only fire rated hoses will be accepted.

Valves:

The following valves are available and will be shipped loose:

- a. Ball valve; bronze material, standard port full flow design, FPT connections.
- b. “Y” strainer; bronze material, FPT connections.
- c. Motorized water valve; slow acting, 24v, FPT connections.

Thermostats:

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

a. Single Stage Digital Manual Changeover

Thermostat shall be a single-stage, digital, auto or manual changeover with HEAT-OFF-COOL-AUTO system switch and fan ON-AUTO switch. Thermostat shall have an LCD display with temperature and set-point(s) in °F.. A fault LED shall be provided to display specific fault condition. Thermostat shall provide temperature display offset for custom applications.

c. Single Stage Digital Automatic or Manual Changeover with Two-Speed Fan Control

Thermostat shall be a single-stage, digital, auto or manual changeover with HEAT-OFF-COOL-AUTO system switch, fan ON-AUTO switch, and fan LO-HI switch. Thermostat shall have an LCD display with temperature and set-point(s) in °F. A fault LED shall be provided to display specific fault condition. Thermostat shall allow use of an accessory remote temperature sensor, but may be operated with internal sensor via orientation of a jumper.

d. Single Stage Digital Automatic Changeover

Thermostat shall be a single-stage, digital, auto or manual changeover with HEAT-OFF-COOL-AUTO system switch and fan ON-AUTO switch. Thermostat shall have an LCD display with temperature and set-point(s) in °F. A fault LED shall be provided to display specific fault condition. Thermostat shall allow use of an accessory remote temperature sensor, but may be operated with internal sensor via orientation of a jumper.