

VERTICAL STACK HYBRID WATER CERTIFIED DRAWING

DWG. NO.
Template VSHW(01-25-19)
 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 1" WASHABLE FILTERS.
- 3: PROVIDE ELECTRONIC OVERFLOW SENSOR.
- 4: PROVIDE UNIT-MOUNTED DIGITAL CONTROL BOARD.
- 5: PROVIDE PAINTED FRONT ACCESS PANEL.
- 6: PROVIDE CONDENSATE LINE WITH INTEGRAL P-TRAP.
- 7: SEE SHEETS 4-7 FOR UNIT DIMENSIONS & LAYOUTS.

UNIT SPECIFICATIONS+

PERFORMACE DATA - COOLING

TABLE 1

COOLING 3GPM/Ton		8VSHW09	8VSHW12	8VSHW15	8VSHW18	8VSHW24	8VSHW30	8VSHW36
MODEL								
TOTAL COOLING	BTUH	9,500	13,200	13,700	17,600	22,700	27,800	36,500
SENSIBLE COOLING	BTUH	7,100	9,700	10,600	12,800	17,100	22,200	26,200
EER w/ECM		14.7	14.8	15.3	15.2	14.1	14.5	13.9
EER w/PSC		14	13.7	14.4	14.4	13	13.7	13
WATER FLOW	GPM	2.3	3	3.8	4.5	6	7.5	9
FAN DATA	CFM	420	500	540	630	770	1,000	1,080

COOLING CAPACITY @ 80.6°F DB, 66.2°F WB EAT; 86°F EWT

PERFORMACE DATA - HEATING

TABLE 2

HEATING @ 3GPM/Ton		8VSHW09	8VSHW12	8VSHW15	8VSHW18	8VSHW24	8VSHW30	8VSHW36
EWT @ 120F	BTUh	12,500	13,400	16,500	18,200	29,000	30,200	37,900
EWT @ 105F	BTUh	8,900	12,800	14,600	15,700	23,200	28,800	29,200
EWT @ 95F	BTUh	6,500	12,200	13,100	14,900	22,100	27,300	27,800

HEATING CAPACITY @ 68°F DB EAT, 59°F WB EAT; 68°F EWT

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DESIGNATION	MODEL NUMBER	QTY
TOTAL		

TABLE 3

MODEL	8VSHW09	8VSHW12	8VSHW15	8VSHW20	8VSHW24	8VSHW30	8VSHW36
COMPRESSOR TYPE (1 EA)	ROTARY						
REFRIGERANT	R410A						
REFRIGERANT FACTORY CHARGE (oz)	26.5	26.8	26.8	36.3	37.0	45.2	61.7
BLOWER WHEEL SIZE (DIAMETERXWIDTH) (IN)	7X7	7X7	7X7	7X7	7X7	8X8	8X8
AIR COIL DIMENSION (IN)	20x11.4	20X11.4	20X11.4	26X12.2	26X12.2	28X17.13	29.5X17.13
STANDARD FILTER-1/2"	29.5X13.9	29.5X13.9	29.5X13.9	31.1X15.9	31.1X15.9	31.6X19.8	31.6X19.8
AC CHASSIS WEIGHT (LB)	107	109	109	152	163	183	205
CABINET WEIGHT (LB)	156	156	156	183	183	260	264

For overall unit dimensions please refer to drawing

TABLE 4

TYPICAL WATER SIDE DATA

MODEL	8VSHW09	8VSHW12	8VSHW15	8VSHW18	8VSHW24	8VSHW30	8VSHW36
FLOW RATE (GPM)	2.25	3	3.75	4.5	6	7.5	9
WATER CONNECTION SIZE (IN)	1/2	1/2	1/2	3/4	3/4	3/4	3/4
CONDENSATE CONNECTION SIZE (IN)	3/4"ID						

OPTIONAL

- 1: STAINLESS STEEL HOSE KITS.
- 2: BALL VALVES.
- 3: SUPPLY GRILLS WITH OBD.
- 4: CHASSIS MOUNTED AUTO FLOW CONTROL.

CUSTOM NOTES

- 1:

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HVAC CONTR.							
GEN. CONTR.							

UNIT SPECIFICATIONS+

ELECTRICAL DATA

TABLE 5

MODEL	VOLTAGE/HZ-PHASE	COMPRESSOR RLA	COMPRESSOR LRA	FAN MOTOR FLA	TOTAL UNIT FLA	MINIMUM CIRCUIT AMPS	MAX FUSE /HACR
8VSHW09	208-230/60-1	4.05	20.0	0.7	5.8	10	15
8VSHW12	208-230/60-1	5.40	27.0	0.7	7.5	12	15
8VSHW15	208/230/60-1	5.40	27.0	2.0	8.0	13	15
8VSHW18	208/230/60-1	7.35	42.0	2.0	11.2	19	15
8VSHW24	208-230/60-1	9.90	55.4	1.85	14.4	24	20
8VSHW30	208/230/60-1	11.60	60.2	1.85	16.5	28	25
8VSHW36	208-230/60-1	15.45	75.6	3.98	23.3	39	35

AIR FLOW CORRECTION TABLE

TABLE 6

	% 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

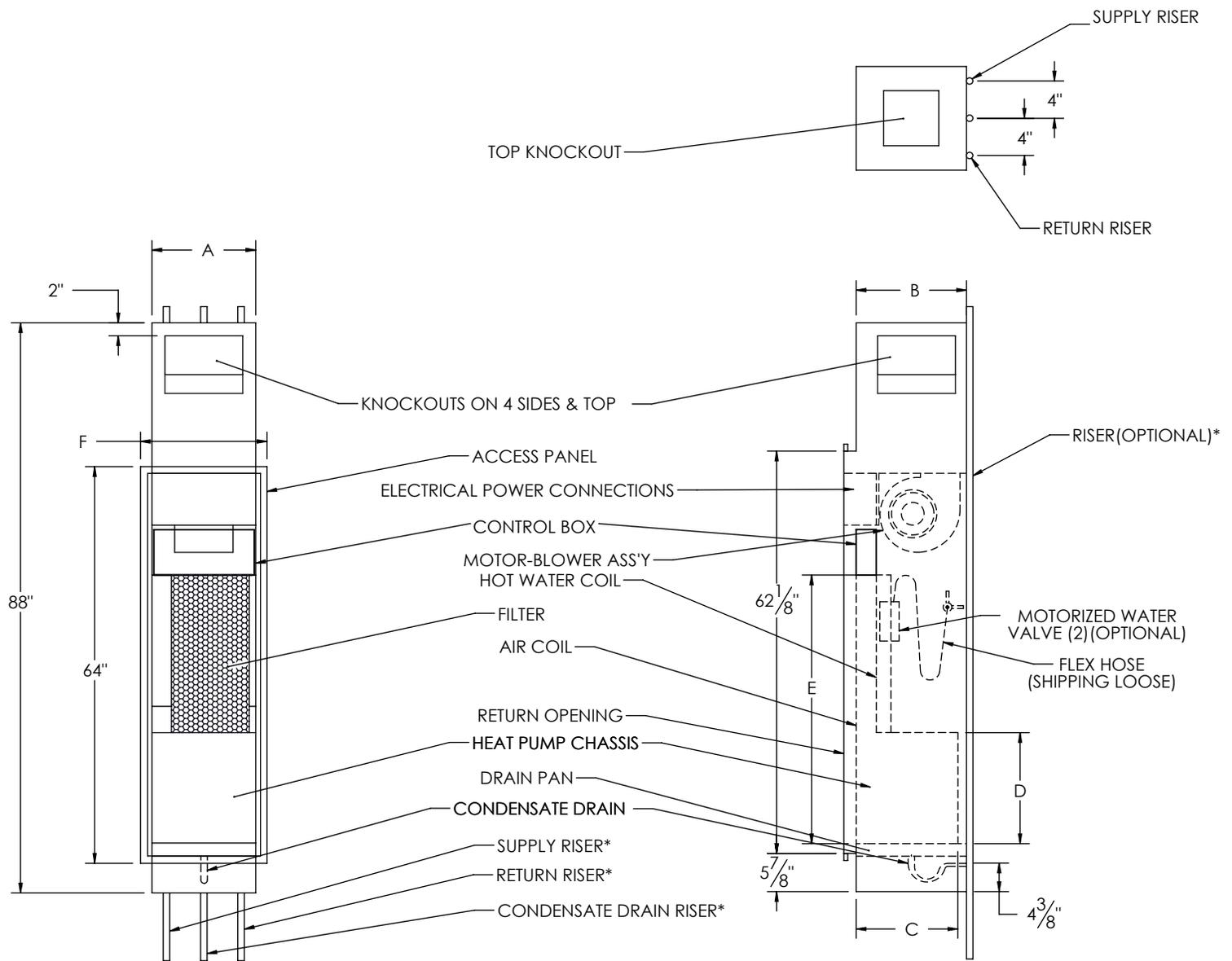
TABLE 7

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 8

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	0.63
	85	*	1.33	1.23	1.09	0.85
	90	*	*	1.48	1.34	1.10
	95	*	*	*	1.56	1.32
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



NOTES.

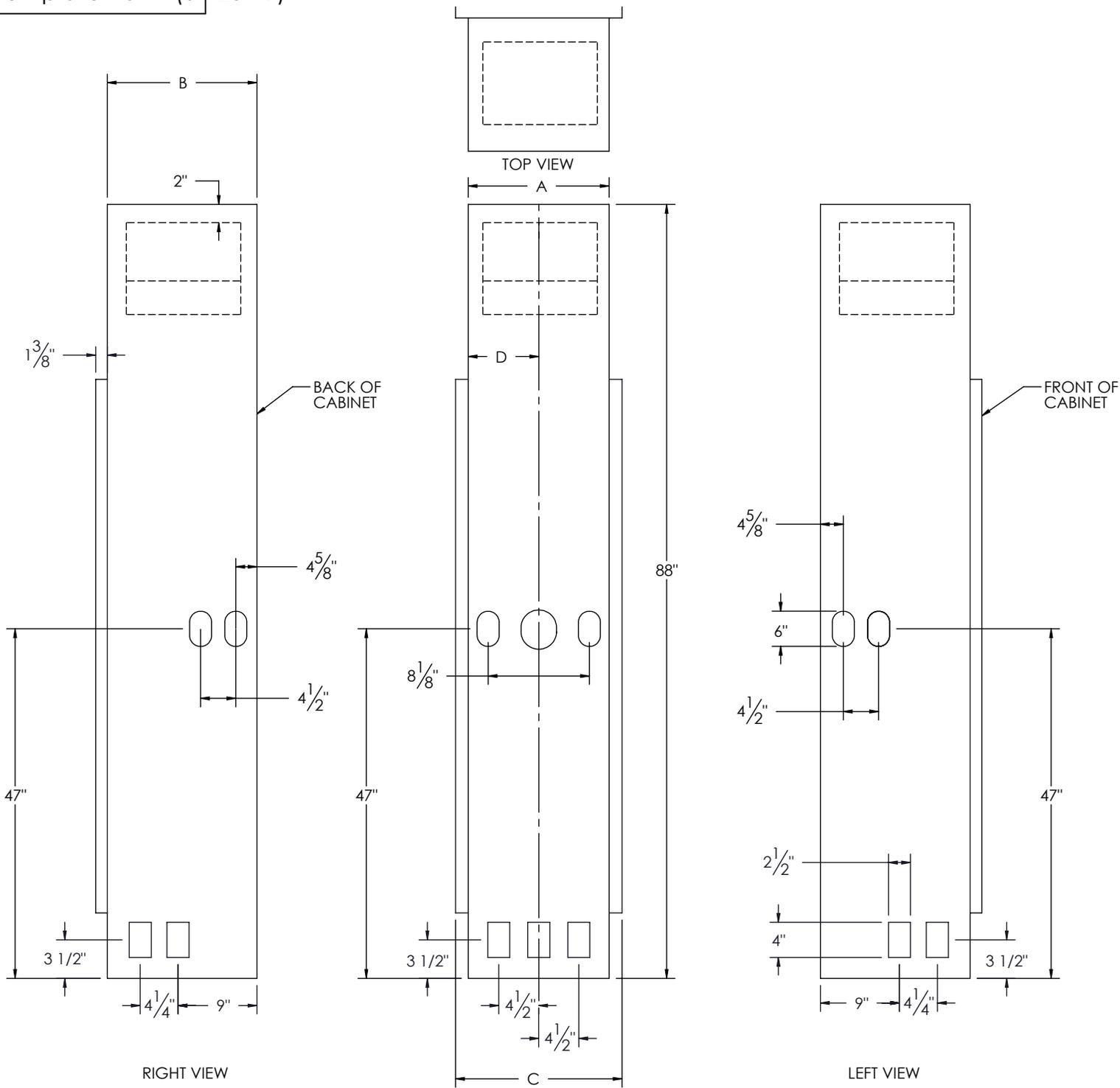
1. Units are fabricated of galvanized steel with a heavy gauge galvanized fan deck.
2. Thermostats shipped loose for field connection.
3. Blower, motor, valves, coils and filter are accessible through the return air opening. Unit and control box are insulated with 1/2" coated glass- fiber insulation.
4. Dimensions are in inches.
5. *Risers are by others.

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

MATERIAL:	ICE-AIR LLC. 80 HARTFORD AVENUE MOUNT VERNON, NY 10553		
WEIGHT (LBS):			
FINISH:	TITLE: VERTICAL STACK HYBRID WATER		
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: 07/14/08	DWG. NO.
	DRAWING BY:	DATE:	
	SIZE A	SCALE: NONE DO NOT SCALE DRAWING	SHEET 4 OF 7
			REV

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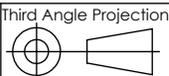
UNIT	A	B	C	D
9,12,15	16	17	19	8
18,24	18	20	21	9
30,36	22	24	25	11

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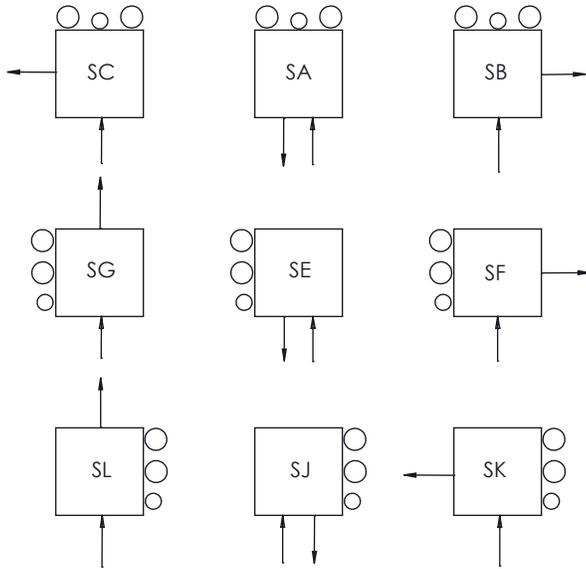
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WEIGHT (LBS):				
FINISH:	TITLE: DIMENSIONAL DRAWING			
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: $\pm 1/32$ ANGULAR: MACH \pm ° BEND $\pm 1^\circ$ TWO PLACE DECIMAL $\pm .03$ THREE PLACE DECIMAL $\pm .015$	MODEL BY:	DATE:	DWG. NO. Template VSHW(01-25-19)	
	DRAWING BY:	DATE:		
	SIZE A	SCALE: NONE DO NOT SCALE DRAWING	SHEET 5 OF 7	REV

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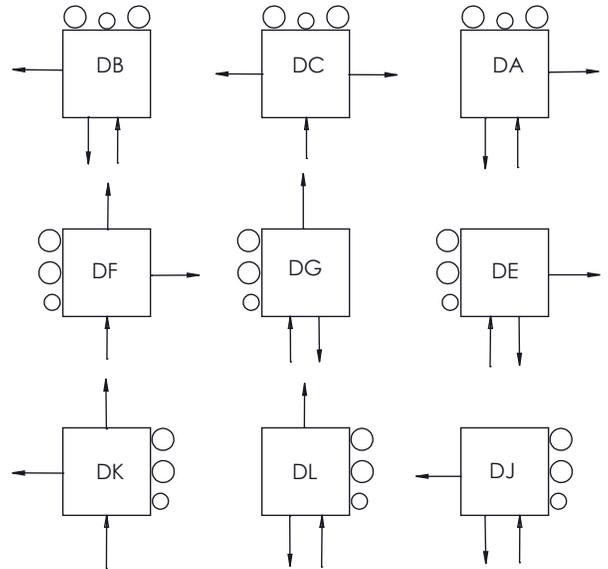
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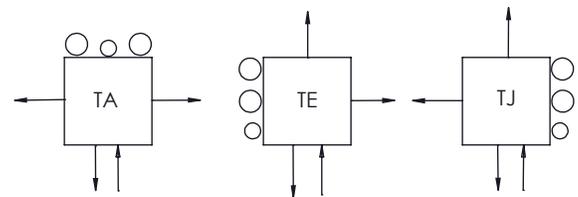
SINGLE SUPPLY



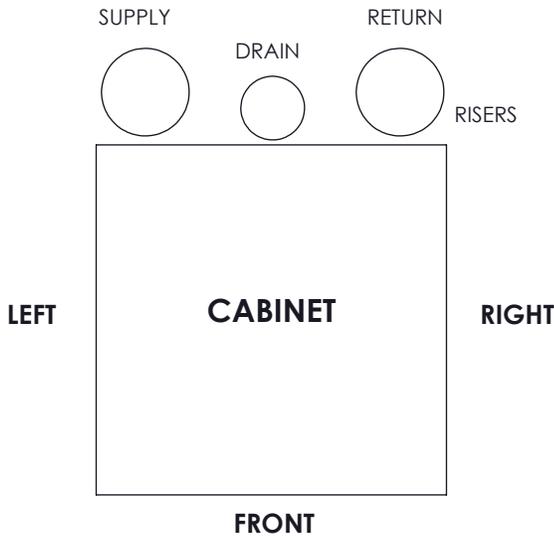
DOUBLE SUPPLY



TRIPLE SUPPLY



← RETURN AIR FROM ROOM
 ← SUPPLY AIR TO ROOM



Notes:

1. The Riser Compartment is defined as being the rear of each unit. Supply air grilles and return/access panel can be any side except rear.
2. Return air location also denotes the control location and service access.
3. Single discharge openings are not recommended for sizes 30-36. Triple discharge openings are not recommended for sizes 09, 12.

NOTES:

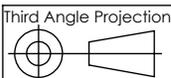
- 1) DIMENSIONS ARE IN INCHES.
- 2) ALL DIMENSIONS ARE +/- 1/4".
- 3) DISCHARGE GRILLES ARE SHIPPED LOOSE FOR FIELD INSTALLATION.
- 4) GRILLE CONSTRUCTION IS ROLL FORMED ALUMINUM FRAME BLADES.
- 5) STANDARD GRILLE FINISH IS "POWDER COATED" AND WILL BE THE SAME COLOR AS THE RETURN GRILLE UNLESS OTHERWISE SPECIFIED.
- 6) GRILLE MOUNTING HARDWARE INCLUDED.

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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:	DATE:	DWG. NO.
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SIZE A	SCALE: NONE DO NOT SCALE DRAWING	SHEET 6 OF 7	REV

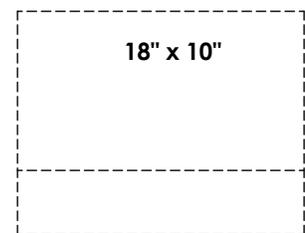
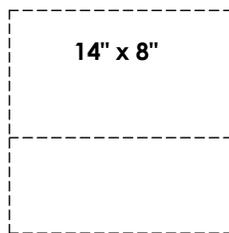
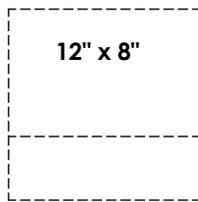
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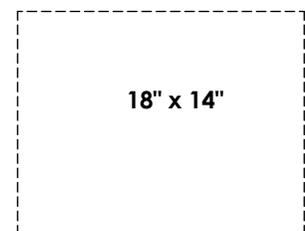
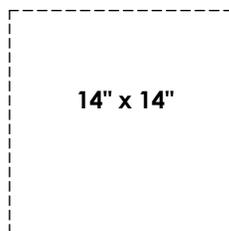
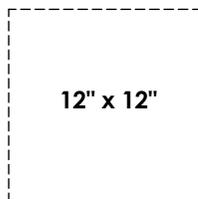


UNIT	SPEED	SINGLE DISCHARGE	DOUBLE DISCHARGE	TRIPLE DISCHARGE	TOP DISCHARGE
		12" x 12"	12" x 8"	12" x 8"	12" x 12"
8VHPW09	HIGH	X	X	NR	X
	LOW				
8VHPW12	HIGH	X	X	NR	X
	LOW				
8VHPW15	HIGH	X	X	X	X
	LOW				
UNIT	SPEED	SINGLE DISCHARGE	DOUBLE DISCHARGE	TRIPLE DISCHARGE	TOP DISCHARGE
		14" x 14"	14" x 8"	14" x 8"	14" x 14"
8VHPW18	HIGH	X	X	X	X
	LOW				
8VHPW24	HIGH	X	X	X	X
	LOW				
UNIT	SPEED	SINGLE DISCHARGE	DOUBLE DISCHARGE	TRIPLE DISCHARGE	TOP DISCHARGE
		18" x 14"	18" x 10"	18" x 10"	18" x 14"
8VHPW30	HIGH	NR	X	X	X
	LOW				
8VHPW36	HIGH	NR	X	X	X
	LOW				

SIDE KNOCHOUTS



TOP KNOCKOUTS



GRILLE SIZES

12" x 8"

12" x 12"

14" x 8"

14" x 14"

18" x 10"

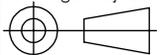
18" x 14"

MATERIAL:	<p align="center">ICE-AIR LLC. 80 HARTFORD AVENUE MOUNT VERNON, NY 10553</p>			
WEIGHT (LBS):				
FINISH:	TITLE: GRILLE CHART	MODEL BY:	DATE:	DWG. NO.
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± 1/32 ANGULAR: MACH ± ° BEND ± 1° TWO PLACE DECIMAL ± .03 THREE PLACE DECIMAL ± .015	DRAWING BY:	DATE:	<p align="center">Template VSHW(01-25-19)</p>	
SIZE A	SCALE: NONE DO NOT SCALE DRAWING	SHEET 7 OF 7		REV

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Third Angle Projection



VERTICAL STACK, MODEL "8VSHW" SIZE 09-36
HYBRID WATER COOLED A/C SPECIFICATIONS

January, 28 2015

General:

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

Vertical Stack Hybrid Water Cooled A/C:

In cooling mode, units shall operate within the entering water temperature range of **60° to 100°F**. All equipment listed in this section must be rated in accordance with American Refrigeration Institute / International Standards Organization (ARI / ISO) standards and shall be safety listed by Environmental Testing Laboratories for United States and Canada (ETL-US-C). The units shall have ETL-US-C labels. All units shall be factory tested under normal operating conditions and water flows.

Casing 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 fully insulated secondary drain pan with a pressure differential drain 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/ft³ (28 kg/m³) 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 of the casing, with the chassis removed.

Chassis:

The chassis, which incorporates the air coil, integral primary drain pan, compressor, coaxial condenser coil, hydronic heating coil and control box, 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. Permanent washable filters will be provided at startup.

Valve Package:

All chassis will have a factory installed valve package. The valve package consists of 2 2-way motorized valves: 1- normally open for heating and 1- normally closed for cooling and 1- auto flow valve, set to allow the specified GPM flow rate to the chassis.

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 mounting 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 rated to withstand 600 PSIG (4136 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 600 PSIG (4136 kPa) working refrigerant pressure and 450 PSIG (3101 kPa) working water pressure. The refrigerant to water heat exchanger shall be “electro-coated” with a low cure epoxy material a minimum of 0.4 mils thick (0.4 – 1.5 mils range) on all surfaces.

Refrigerant metering shall be accomplished by thermostatic expansion valve or capillary tube. Expansion valves shall be dual port balanced types with external equalizer for optimum refrigerant metering. Reversing valve shall be four-way solenoid activated refrigerant valve, which shall default to heating mode should the solenoid fail to function.

High Capacity Hot Water Coil

Provide integral chassis mounted high capacity Hydronic Heating Coil consisting of lanced aluminium fins and a (rifled) copper tube water-to-air heat exchanger. Hydronic coil to contain sufficient tubing rows and multiple circuits to meet heating capacities required at specified entering water temperatures and flow rates.

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 a double 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.

Unit shall contain a breaker type disconnect switch which allows for power disconnect for safely servicing the unit electrical and electronic systems.

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. 208V 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 “brushed” aluminum with optional powder coating, or powder coated steel. Color to be approved by architect.

Front/Return panel:

The return panel shall be architecturally designed, acoustic type, flush mounted panel with hinged door for east 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 gage die formed galvanized steel with a powder coat finish. Color to be approved by architect.

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.

FIELD INSTALLED OPTIONS

Hose Kits (required for field water connections):

Water connections between chassis and the cabinet shall be accomplished via a hose kit surrounded by 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 the 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. This dual hose kit accessory is required for each cabinet.

Thermostats:

The thermostat shall be a Ice Air digital 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. Thermostat to be NYSERDA MPP compliant.

Thermostats will be supplied with a 25' wire whip and quick disconnects on both sides