VILTER®
Since 1867

VSA / VSC

EVAPORATIVE CONDENSERS

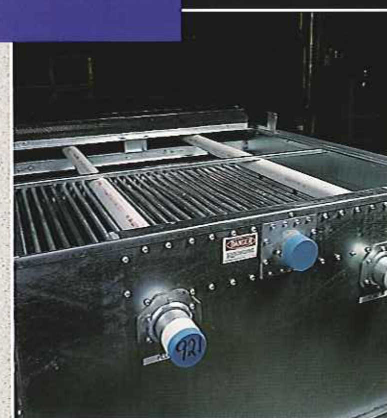
Forced Draft • Variable Speed • Axial & Centrifugal Fans

VSA Axial Fan Unit

Design

Eliminators

Corrosion resistant PVC drift eliminators limit drift loss to 0.002% of the total water circulated. The spray system provides efficient and uniform flooding of the condenser coil.

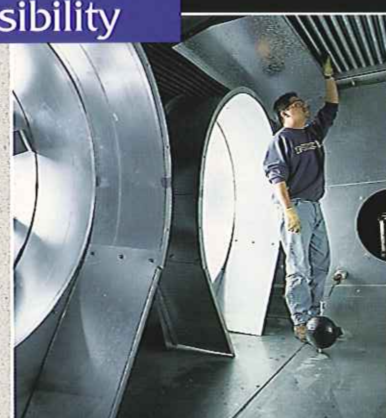


The VSA series of evaporative condensers utilize 2-stage axial fans to significantly reduce power requirements. These units are designed and constructed to provide cost effective solutions in industrial refrigeration applications. Standard VSA design features that reduce the total cost of ownership include:

- High heat rejection capacity in a small footprint for low space requirements.
- Variable frequency fan drive system reduces energy consumption at part load operating conditions and eliminates the need for fan partitions while allowing close control of discharge pressure.
- G-235 hot dip galvanized steel panels with double-brake flanges for maximum structural integrity.
- Corrosion resistant PVC drift eliminators.
- Accessible interior space for maintenance.
- Hot dip galvanized coil section.
- Externally mounted TEFC motors.

Tank Accessibility

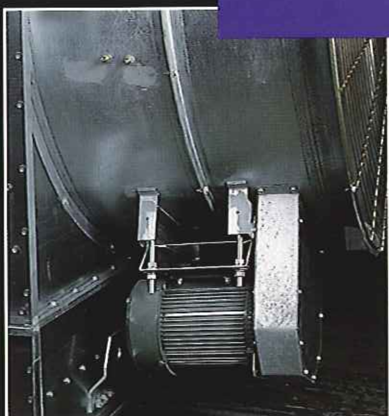
Accessible interior space for service of the suction strainer, float assembly, and sump when required.



VSA Fan Assembly

Two-stage, high efficiency axial fans operate at low speed. The fans are statically balanced and operate within fan cylinders that have curved inlets for efficient air entry.

Features



Fan Motor

Externally mounted (internally on VSC series) fan motors and all rotating parts located near the base are accessible for cleaning, lubrication or adjustment. Totally Enclosed Fan Cooled (TEFC) motors are utilized for all fan and pump motors.

Coil Section

The condensing coil is all prime surface steel having a design pressure of 280 psig. The coil is tested at 350 psig air pressure under water and completely hot-dip galvanized after fabrication.

VSC Fan Assembly

Dynamically balanced centrifugal fans are shaft mounted with oversized, self-aligning heavy duty bearings. The fans are mounted on a steel shaft supported by heavy duty, self-aligning bearings with cast iron housings.

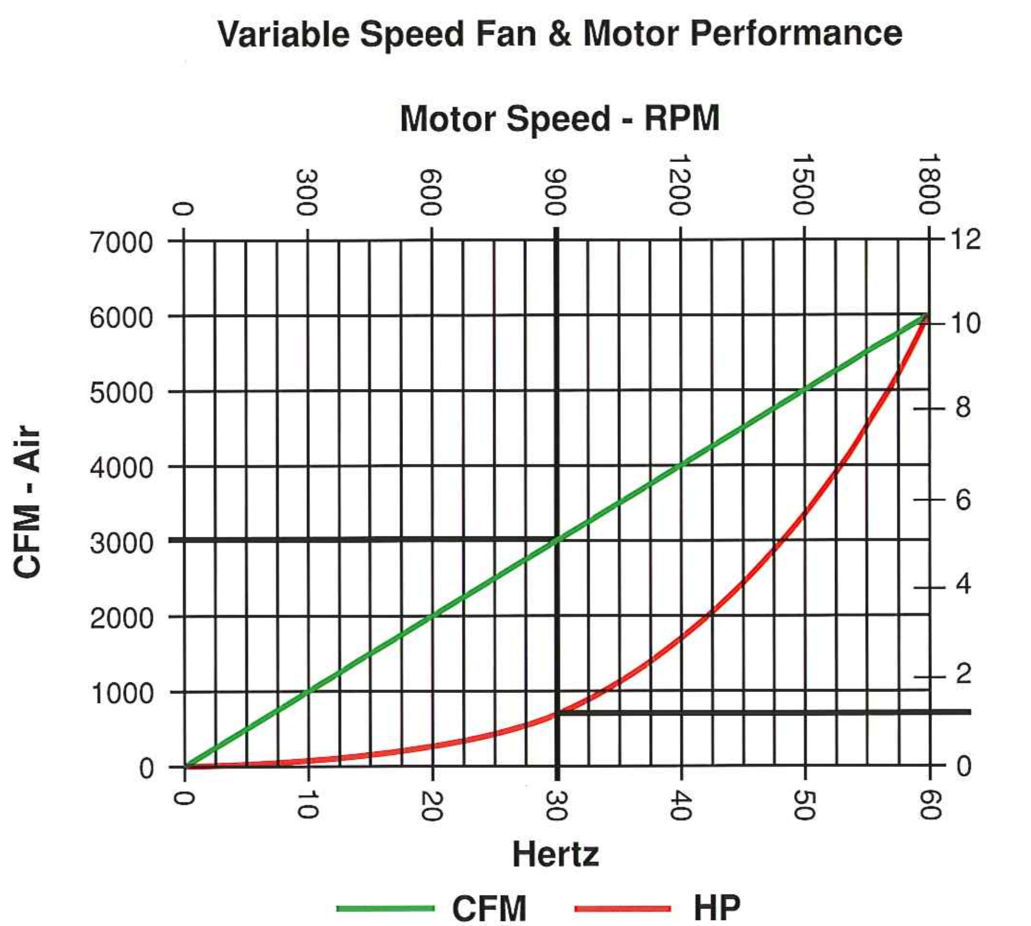
The VSC series of evaporative condensers is available for installations where sound level is a concern. The forward curved centrifugal fans operate at 8 to 10 decibels lower than axial fans. These units have the same rugged construction features as the VSA series, including:

- High heat rejection capacity in a small footprint for low space requirements.
- Variable frequency fan drive system reduces energy consumption at part load operating conditions and eliminates the need for capacity control dampers while allowing close control of discharge pressure.
- G-235 hot dip galvanized steel panels with double-brake flanges for maximum structural integrity.
- Corrosion resistant PVC drift eliminators.
- Dynamically balanced centrifugal fans.
- Hot dip galvanized coil section.
- Internally mounted TEFC motors.

Capacity Control for Vilter Evaporative Condensers

The fan/motor curve below indicates typical variable speed performance for part load operation for a 10 HP fan motor arrangement. Most evaporative condensers installed today rely on some combination of fan cycling to maintain condensing pressure. Fan cycling for condenser capacity control results in numerous motor starts and does not lend itself to close discharge pressure control or energy savings.

The factory matched variable speed system supplied by Vilter provides the inherent power savings available when variable frequency drives (VFD's) are utilized for fan systems and permits close control of the condensing pressure.



For multiple fan drives on the condenser the recommended approach is to use a single variable frequency drive unit to control all the fan motors at a single frequency, simplifying the installation.

The use of the VFD control system does not require fan partitions, which are necessary with fan cycling, to prevent the non-energized fan from reverse rotation and potential water loss.

The VFD supplied by Vilter includes power supply monitoring capabilities for protection of the fan motor(s) and VFD module in the event of power supply variations.

Available Savings

As an example, the total installed fan horsepower of 10 hp operating at 50% of the total fan CFM results in:

- A motor hp of approximately 1.25 hp with the VFD @ 30 Hz.
- If fan cycling @ 60 Hz is utilized, the required motor hp would be 10 hp operating at one-half the duration, or the equivalent of 5 hp.
- At this operating condition the power consumption with the VFD is 75% less than the intermittent full load power.

Variable Frequency Drives (VFD's or Inverters)

A variable frequency drive, as used on the VSA and VSC evaporative condensers, is a device that receives three phase, 60 Hz power from the utility company and converts it to a variable voltage and frequency for speed control of a motor.

Vilter VSA and VSC evaporative condensers use inverter duty motors which are field connected in parallel for simultaneous operation. All motors are driven by the VFD at the same speed to control the condensing pressure. Since all of the fans are operating at the same speed and static air pressure, the need for fan partitions is eliminated.

With fan cycling pressure control, fan partitions are mandatory to prevent air recirculation through the idled fan(s), since the static air pressure is higher in the operating fan chamber.

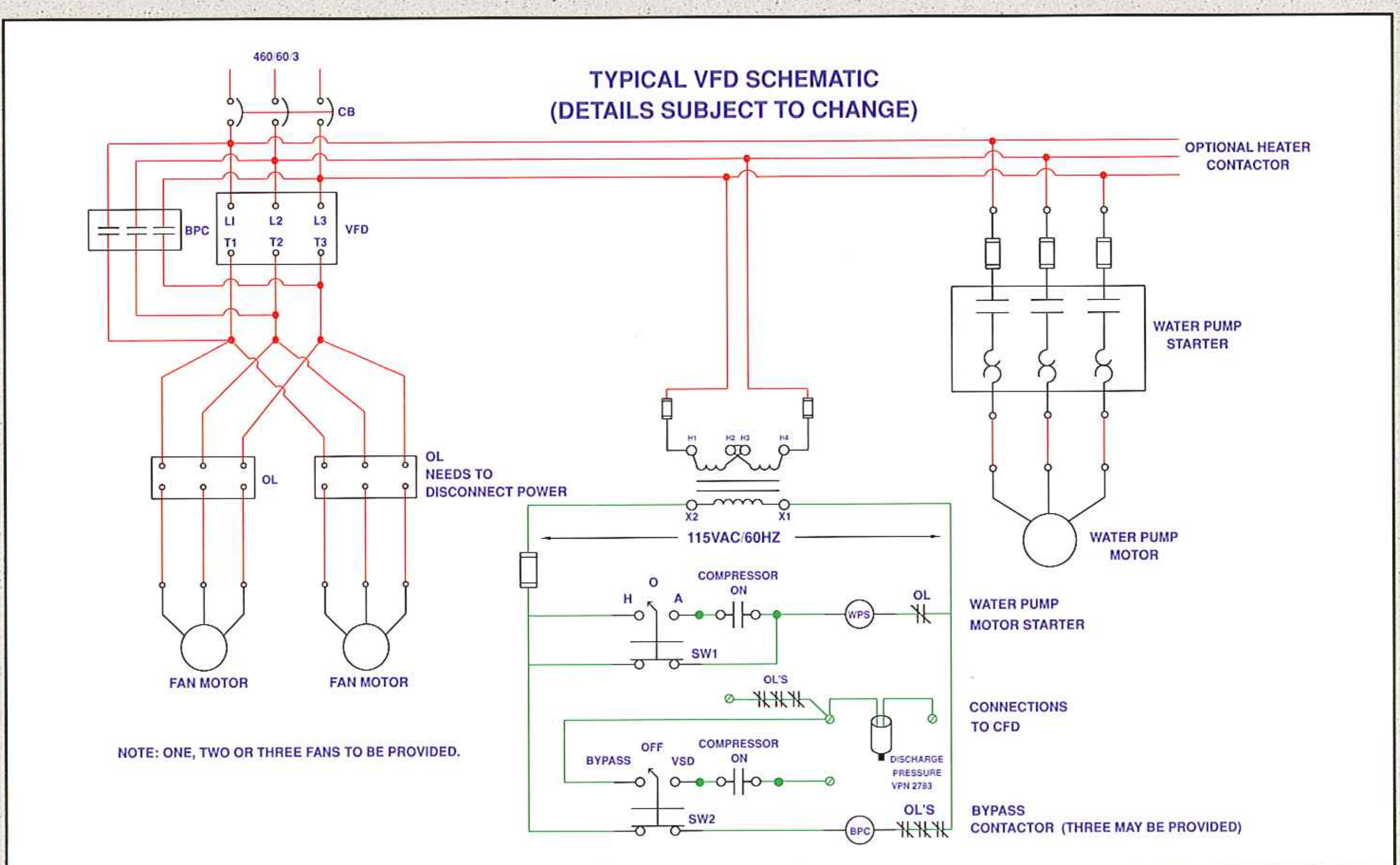
The standard motors supplied by Vilter are suitable for use with constant speed full voltage starting (across-line) if desired; however, fan partitions must be used.

The VFD system supplied by Vilter replaces all of the common components traditionally installed for evaporative condenser control, and is provided in a single pre-wired NEMA 1 enclosure to reduce total installation costs.

The Vilter VFD system includes:

- Main circuit breaker and disconnect
- Variable frequency drive module
- VFD fan motor bypass contactors
- Individual fan overload protection
- Fused water pump starter
- Hand-Off-Auto switches for VFD and pump
- 120 VAC control power transformer
- Condensing pressure transducer (field installed in discharge line)
- Sump heater contactors are supplied if optional water sump heaters are ordered

The VFD fan motor bypass contactors allow the fans to operate in the event of a VFD failure and remove power from the VFD module for service. The individual fan overload protection will allow any fan motor not in an overload condition to continue operating.



Selection – Heat Rejection Method

Example

Compressor capacity	= 336 Tons	= 336 x 12 MBH / Ton	= 4032	MBH (Capacity)
Compressor power	= 340 BHP	= 340 x 2.545 MBH / BHP	+ = 865	MBH (Power)
		Total MBH	4897	MBH (Total)
Oil cooling load*	= 211 MBH		- 211	
			4686	MBH

*Deduct the oil cooling heat load only when the heat load is rejected to some other heat sink, i.e., water, air, or glycol loop. For thermosyphon, liquid injection, or V-PLUS® oil cooling systems, the oil cooling heat load remains in the total system heat rejection.

Select the heat rejection capacity factor for the design operating conditions and the intended refrigerant from Table 2.

Condensing temperature = 95°F.
Entering wet bulb temp. = 80°F.
Refrigerant = Ammonia
Correction factor = 1.64

Compressor with oil cooling load included = 4897 x 1.64 = 8031 MBH
Compressor with oil cooling load excluded = 4686 x 1.64 = 7685 MBH

Select a condenser style from Table 1 with a capacity equal to or greater than the full load corrected heat rejection calculated.

Recommended selections:
- Model VSA-578 with a capacity of 8497 MBH.
- Two (2) Model VSC-275's with a total capacity of 8086 MBH.

Table 1 - Base Heat Rejection Capacities for VSA & VSC Evaporative Condensers (1 MBH = 1000 BTU/Hour)

VSA Condensers

Axial Model No.	Capacity MBH	Axial Model No.	Capacity MBH
VSA-142	2087	VSA-522	7673
VSA-161	2367	VSA-578	8497
VSA-182	2675	VSA-602	8849
VSA-211	3102	VSA-646	9496
VSA-183	2690	VSA-630	9261
VSA-206	3028	VSA-712	10466
VSA-235	3455	VSA-792	11642
VSA-259	3807	VSA-872	12818
VSA-288	4234	VSA-982	14435
VSA-261	3837	VSA-1044	15347
VSA-289	4248	VSA-1156	16993
VSA-301	4425	VSA-1204	17699
VSA-323	4748	VSA-1292	18992
VSA-315	4631	VSA-1260	18522
VSA-356	5233	VSA-1424	20933
VSA-396	5821	VSA-1584	23285
VSA-436	6409	VSA-1744	25637
VSA-491	7218	VSA-1964	28871

VSC Condensers

Centrifugal Model No.	Capacity MBH	Centrifugal Model No.	Capacity MBH
VSC-30	441	VSC-185	2720
VSC-38	559	VSC-205	3014
VSC-46	676	VSC-208	3058
VSC-52	764	VSC-230	3381
VSC-58	853	VSC-243	3572
VSC-65	956	VSC-257	3778
VSC-72	1058	VSC-275	4043
VSC-80	1176	VSC-301	4425
VSC-90	1323	VSC-315	4631
VSC-100	1470	VSC-338	4969
VSC-110	1617	VSC-357	5248
VSC-125	1838	VSC-373	5483
VSC-135	1985	VSC-417	6130
VSC-150	2205	VSC-470	6909
VSC-165	2426		

Table 2 - Heat Rejection Capacity Factors - R-717 (Ammonia)

R-717 Cond. Pres. Psi(g)	R-717 Cond. Temp. °F	Entering Wet Bulb Temperature °F																
		50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82
151.7	85	.97	1.01	1.06	1.11	1.17	1.25	1.33	1.43	1.55	1.70	1.89	2.14	2.47	2.97	—	—	—
165.9	90	.83	.86	.89	.93	.97	1.01	1.07	1.13	1.20	1.28	1.38	1.51	1.67	1.87	2.13	2.51	3.08
168.9	91	.80	.83	.86	.90	.93	.98	1.02	1.08	1.14	1.22	1.31	1.42	1.56	1.73	1.96	2.27	2.72
171.9	92	.78	.81	.83	.87	.90	.94	.99	1.04	1.10	1.17	1.25	1.35	1.47	1.62	1.82	2.08	2.44
174.9	93	.76	.78	.81	.84	.87	.91	.95	1.00	1.05	1.11	1.19	1.28	1.38	1.52	1.69	1.91	2.21
178.0	94	.74	.76	.79	.81	.84	.88	.92	.96	1.01	1.07	1.13	1.21	1.31	1.43	1.58	1.77	2.02
181.1	95	.72	.74	.76	.79	.82	.85	.88	.92	.97	1.02	1.08	1.16	1.24	1.35	1.48	1.64	1.86
185.0	96.3	.69	.71	.73	.76	.78	.81	.84	.88	.92	.97	1.02	1.09	1.16	1.25	1.36	1.50	1.68
187.4	97	.68	.70	.72	.74	.77	.79	.83	.86	.90	.94	.99	1.05	1.13	1.21	1.31	1.44	1.60
190.6	98	.66	.68	.70	.72	.74	.77	.80	.83	.87	.91	.96	1.01	1.07	1.15	1.24	1.35	1.49
193.9	99	.65	.66	.68	.70	.72	.75	.77	.80	.84	.87	.92	.97	1.03	1.10	1.18	1.28	1.40
197.2	100	.63	.65	.66	.68	.70	.72	.75	.78	.81	.84	.88	.93	.98	1.05	1.12	1.21	1.32
214.2	105	.56	.57	.58	.60	.61	.63	.65	.67	.69	.71	.74	.77	.81	.85	.89	.95	1.01
232.3	110	.50	.51	.52	.53	.54	.55	.57	.58	.60	.62	.64	.66	.68	.71	.74	.78	.82

Table 3 - Heat Rejection Capacity Factors - R-22, R-134a

R-22 Cond. Pres. Psi(g)	R-134a Cond. Pres. Psi(g)	Cond. Temp. °F.	Entering Wet Bulb Temperature °F																
			50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82
155.7	95.2	85	1.09	1.14	1.19	1.25	1.32	1.40	1.49	1.60	1.74	1.91	2.12	2.40	2.78	3.33	—	—	—
168.4	104.3	90	.93	.96	1.00	1.04	1.09	1.14	1.20	1.27	1.35	1.44	1.56	1.70	1.87	2.10	2.40	2.82	3.46
171.0	106.2	91	.90	.93	.97	1.01	1.05	1.10	1.15	1.21	1.29	1.37	1.47	1.60	1.75	1.95	2.20	2.55	3.06
173.7	108.1	92	.88	.91	.94	.97	1.01	1.06	1.11	1.16	1.23	1.31	1.40	1.51	1.65	1.82	2.04	2.33	2.74
176.4	110.0	93	.85	.88	.91	.94	.98	1.02	1.07	1.12	1.18	1.25	1.33	1.43	1.56	1.71	1.90	2.14	2.49
179.1	112.0	94	.83	.85	.88	.91	.95	.98	1.03	1.08	1.13	1.20	1.27	1.35	1.47	1.60	1.77	1.98	2.27
181.8	113.9	95	.81	.83	.86	.88	.92	.95	.99	1.04	1.09	1.15	1.22	1.30	1.40	1.51	1.66	1.84	2.09
184.6	115.9	96	.79	.81	.83	.86	.89	.92	.96	1.00	1.05	1.10	1.17	1.24	1.33	1.43	1.56	1.72	1.93
187.4	117.9	97	.76	.79	.81	.83	.86	.89	.93	.97	1.01	1.06	1.12	1.18	1.26	1.36	1.47	1.61	1.80
190.2	120.0	98	.75	.76	.79	.81	.84	.86	.90	.93	.97	1.02	1.07	1.13	1.21	1.29	1.39	1.52	1.68
193.0	122.0	99	.73	.74	.77	.79	.81	.84	.87	.90	.94	.98	1.03	1.09	1.15	1.23	1.32	1.43	1.57
195.9	124.1	100	.71	.73	.74	.77	.79	.81	.84	.87	.91	.95	.99	1.04	1.10	1.17	1.26	1.36	1.48
210.7	134.9	105	.63	.64	.66	.67	.69	.71	.73	.75	.77	.80	.83	.87	.91	.95	1.00	1.07	1.14
226.4	146.3	110	.56	.57	.58	.60	.61	.62	.64	.65	.67	.69	.71	.74	.77	.80	.83	.87	.92

Application Notes:

For multi-stage compression systems the total heat rejection is calculated from the total high stage compressor capacity (Tons) plus the total compressor power (BHP) converted to Btu/hour. If the oil cooling load is rejected to a separate heat sink, deduct the total oil cooling heat load from the total compressor heat rejection.

Fan orientation is determined by facing the coil connections. Right hand indicates the fans are on the right side facing the coil connections.

Selection – Evaporator Ton Method

The evaporator ton selection method should only be used for selecting evaporative condensers on systems where open drive reciprocating compressors are the sole compressor type utilized.

This method is based on estimated horsepower requirements for open drive reciprocating compressors only, and cannot be considered to be precise. Critical selections should be verified by the heat rejection method given earlier.

Selection Procedure

1. Determine the evaporator capacity in tons of refrigeration (one Ton = 12,000 BTUH).
2. Determine refrigerant used and the design conditions for the condensing temperature, suction temperature, and wet bulb temperature.
3. Using appropriate table for the system refrigerant (Tables 5 or 6), select the correction factor for the condensing temperature and wet bulb temperature, and the correction factor for the suction temperature.
4. Multiply the evaporator capacity (in tons) by the two correction factors selected in Step 3.
5. From Table 4, select the evaporative condenser whose model number equals or exceeds the corrected evaporator capacity calculated in Step 4.

Selection Example

(Open Drive Reciprocating Compressors Only)

Given: R-717 refrigerant
Evaporator capacity = 325 tons of refrigeration
Condensing Temperature = 95°F
Suction Temperature = 10°F
Wet bulb temperature = 80°F

Solution

1. Determine capacity factor for R-717 at 95°F condensing temperature and 80°F wet bulb temperature from Table 5 (1.70).
2. Determine the suction temperature correction factor for 10°F from Table 5 (1.04).
3. Multiply 325 x 1.70 x 1.04 = 574.6 corrected tons.
4. From Table 4 select a unit with a base capacity equal to or greater than 574.6 corrected tons.

Recommended selections:

- Model VSA-578 with a capacity of 578 tons.
- Two (2) Model VSC-301's with a total capacity of 602 tons.

Note: Consult Vilter for evaporative condenser applications which require a desuperheater coil.

Table 4 - Base Evaporator Tons Capacity

VSA Condensers

Axial Model No.	Corrected Evaporator Tons	Axial Model No.	Corrected Evaporator Tons
VSA-142	142	VSA-522	522
VSA-161	161	VSA-578	578
VSA-182	182	VSA-602	602
VSA-211	211	VSA-646	646
VSA-183	183	VSA-630	630
VSA-206	206	VSA-712	712
VSA-235	235	VSA-792	792
VSA-259	259	VSA-872	872
VSA-288	288	VSA-982	982
VSA-261	261	VSA-1044	1044
VSA-289	289	VSA-1156	1156
VSA-301	301	VSA-1204	1204
VSA-323	323	VSA-1292	1292
VSA-315	315	VSA-1260	1260
VSA-356	356	VSA-1424	1424
VSA-396	396	VSA-1584	1584
VSA-436	436	VSA-1744	1744
VSA-491	491	VSA-1964	1964

VSC Condensers

Centrifugal Model No.	Corrected Evaporator Tons	Centrifugal Model No.	Corrected Evaporator Tons
VSC-30	30	VSC-185	185
VSC-38	38	VSC-205	205
VSC-46	46	VSC-208	208
VSC-52	52	VSC-230	230
VSC-58	58	VSC-243	243
VSC-65	65	VSC-257	257
VSC-72	72	VSC-275	275
VSC-80	80	VSC-301	301
VSC-90	90	VSC-315	315
VSC-100	100	VSC-338	338
VSC-110	110	VSC-357	357
VSC-125	125	VSC-373	373
VSC-135	135	VSC-417	417
VSC-150	150	VSC-470	470
VSC-165	165		

Table 5 - Evaporator Capacity Factors - R-717 (Ammonia)

R-717 Cond. Pres. Psi(g)	R-717 Cond. Temp. °F	Entering Wet Bulb Temperature °F																
		50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82
151.7	85	.98	1.02	1.07	1.12	1.18	1.26	1.34	1.44	1.56	1.71	1.90	2.15	2.50	2.99	—	—	—
165.9	90	.85	.88	.91	.95	.99	1.03	1.09	1.15	1.22	1.31	1.41	1.54	1.70	1.91	2.18	2.56	3.14
168.9	91	.82	.85	.88	.92	.95	1.00	1.05	1.11	1.17	1.25	1.34	1.46	1.60	1.78	2.01	2.33	2.79
171.9	92	.80	.83	.86	.89	.92	.96	1.01	1.06	1.12	1.20	1.28	1.38	1.51	1.66	1.86	2.13	2.51
174.9	93	.78	.81	.83	.86	.90	.93	.98	1.02	1.08	1.15	1.22	1.31	1.42	1.56	1.74	1.96	2.27
178.0	94	.76	.78	.81	.84	.87	.90	.94	.99	1.04	1.10	1.17	1.25	1.35	1.47	1.62	1.82	2.08
181.1	95	.74	.76	.79	.81	.84	.88	.91	.95	1.00	1.06	1.12	1.19	1.28	1.39	1.53	1.70	1.92
185.0	96.3	.72	.74	.76	.79	.81	.84	.88	.91	.96	1.01	1.06	1.13	1.21	1.30	1.41	1.56	1.74
187.4	97	.71	.73	.75	.77	.80	.82	.86	.89	.93	.98	1.03	1.10	1.17	1.26	1.36	1.49	1.66
190.6	98	.69	.71	.73	.75	.77	.80	.83	.86	.90	.95	.99	1.05	1.12	1.20	1.29	1.41	1.55
193.9	99	.67	.69	.71	.73	.75	.78	.81	.84	.87	.91	.96	1.01	1.07	1.14	1.23	1.33	1.46
197.2	100	.66	.68	.69	.71	.73	.76	.78	.81	.85	.88	.92	.97	1.03	1.09	1.17	1.26	1.38
214.2	105	.59	.61	.62	.63	.65	.67	.69	.71	.73	.76	.79	.82	.86	.90	.95	1.00	1.07
232.3	110	.54	.55	.56	.57	.58	.59	.61	.62	.64	.66	.68	.71	.73	.76	.79	.83	.88

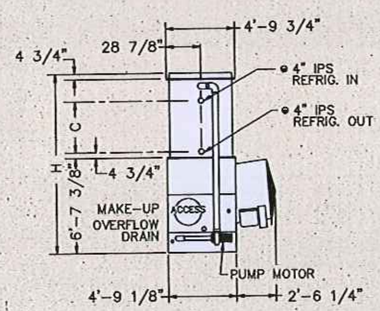
Suction Temperature °F	-20	-10	0	+10	+20	+30	+40	+50
Capacity Factor	1.14	1.11	1.07	1.04	1.00	.98	.95	.93

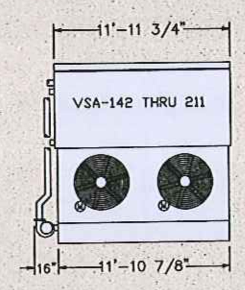
Table 6 - Evaporator Capacity Factors - R-22, R-134a

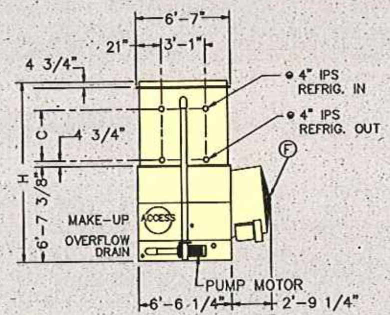
R-22 Cond. Pres. Psi(g)	R-134a Cond. Pres. Psi(g)	Cond. Temp. °F.	Entering Wet Bulb Temperature °F																
			50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82
155.7	95.2	85	1.04	1.09	1.14	1.19	1.26	1.33	1.42	1.53	1.66	1.82	2.02	2.29	2.65	3.18	—	—	—
168.4	104.3	90	.90	.93	.96	1.00	1.05	1.10	1.15	1.22	1.30	1.39	1.50	1.64	1.80	2.02	2.31	2.72	3.33
171.0	106.2	91	.87	.90	.94	.97	1.01	1.06	1.11	1.17	1.24	1.33	1.43	1.55	1.69	1.88	2.13	2.47	2.95
173.7	108.1	92	.85	.88	.91	.94	.98	1.02	1.07	1.13	1.19	1.27	1.36	1.47	1.60	1.76	1.98	2.26	2.66
176.4	110.0	93	.83	.85	.88	.91	.95	.99	1.04	1.09	1.15	1.22	1.30	1.39	1.51	1.66	1.84	2.08	2.41
179.1	112.0	94	.81	.83	.86	.89	.92	.96	1.00	1.05	1.10	1.17	1.24	1.33	1.43	1.56	1.72	1.93	2.21
181.8	113.9	95	.79	.81	.84	.86	.89	.93	.97	1.01	1.06	1.12	1.19	1.27	1.36	1.48	1.62	1.80	2.04
184.6	115.9	96	.77	.79	.81	.84	.87	.90	.94	.98	1.03	1.08	1.14	1.21	1.30	1.40	1.53	1.68	1.89
187.4	117.9	97	.75	.77	.79	.82	.84	.88	.91	.95	.99	1.04	1.10	1.16	1.24	1.33	1.44	1.58	1.76
190.2	120.0	98	.73	.75	.77	.80	.82	.85	.88	.92	.96	1.00	1.05	1.11	1.19	1.27	1.37	1.49	1.65
193.0	122.0	99	.72	.73	.75	.78	.80	.83	.86	.89	.93	.97	1.02	1.07	1.14	1.21	1.30	1.41	1.55
195.9	124.1	100	.70	.72	.74	.76	.78	.80	.83	.86	.90	.94	.98	1.03	1.09	1.16	1.24	1.34	1.46
210.7	134.9	105	.63	.64	.66	.67	.69	.71	.73	.75	.77	.80	.83	.87	.91	.95	1.00	1.07	1.14
226.4	146.3	110	.57	.58	.59	.60	.62	.63	.65	.66	.68	.70	.72	.75	.78	.81	.84	.88	.93

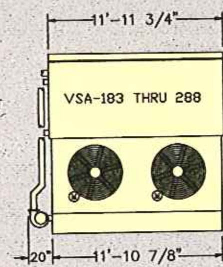
Suction Temperature °F	-20	-10	0	+10	+20	+30	+40	+50
Capacity Factor	1.20	1.16	1.13	1.09	1.06	1.03	1.00	.96

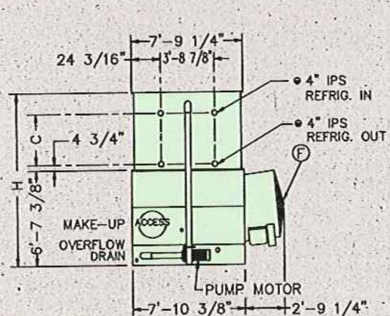
Engineering Data for VSA Units

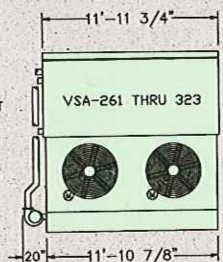


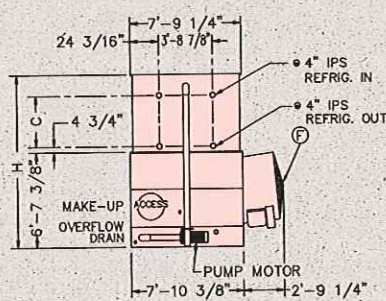


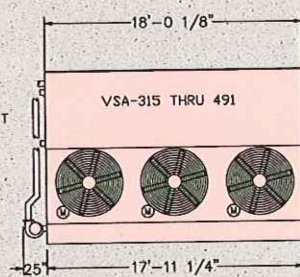












Note: Ⓕ **Fan section assemblies ship loose for field installation**

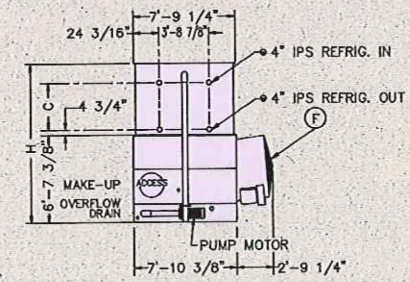
General Information												Remote Sump Data		
Model Number*	R-717 Tons*	Fan CFM	Fan HP @ 0" static	Water Flow GPM	Water Pump HP	R-717 Oper. Charge lbs.	Heaviest Section lbs.	Apprx. Oper. Weight lbs.	Apprx. Ship. Weight lbs.	Coil Center (C) in.	Overall Height (H) ft.-in.	Drain Size in.	Apprx. Oper. Weight lbs.	Gal. Req.
VSA-142	101	26270	(2) 3	220	1.5	170	4430	10225	7685	33 1/4	11-2 1/2	6	9925	210
VSA-161	114	25990	(2) 3	220	1.5	210	5305	11185	8560	42 1/2	11-11 3/4	6	10885	210
VSA-182	129	30818	(2) 5	220	1.5	210	5305	11225	8600	42 1/2	11-11 3/4	6	10925	210
VSA-211	149	34460	(2) 7.5	220	1.5	245	6180	12245	9535	51 3/4	12-9	6	11945	210
VSA-183	130	33450	(2) 3	305	2	230	6140	12390	9905	33 1/4	11-2 1/2	6	12080	290
VSA-206	146	39650	(2) 5	305	2	230	6140	12430	9945	33 1/4	11-2 1/2	6	12120	290
VSA-235	167	38750	(2) 5	305	2	290	7360	13765	11165	42 1/2	11-11 3/4	6	13455	290
VSA-259	184	44360	(2) 7.5	305	2	290	7360	13825	11225	42 1/2	11-11 3/4	6	13515	290
VSA-288	204	47750	(2) 10	305	2	350	8580	15175	12465	51 3/4	12-9	6	14865	290
VSA-261	185	43400	(2) 5	385	3	360	8460	15775	12455	42 1/2	12-0 1/8	8	15445	365
VSA-289	205	49680	(2) 7.5	385	3	360	8460	15835	12515	42 1/2	12-0 1/8	8	15505	365
VSA-301	213	48550	(2) 7.5	385	3	430	9860	17375	13915	51 3/4	12-9 3/8	8	17045	365
VSA-323	229	53440	(2) 10	385	3	430	9860	17395	13935	51 3/4	12-9 3/8	8	17065	365
VSA-315	223	57070	(3) 3	580	5	435	10390	21045	16255	33 1/4	11-2 7/8	10	20485	545
VSA-356	252	67650	(3) 5	580	5	435	10390	21105	16315	33 1/4	11-2 7/8	10	20545	545
VSA-396	281	65700	(3) 5	580	5	540	12570	23495	18495	42 1/2	12-0 1/8	10	22935	545
VSA-436	310	75210	(3) 7.5	580	5	540	12570	23585	18585	42 1/2	12-0 1/8	10	23025	545
VSA-491	348	80490	(3) 10	580	5	645	14750	26015	20795	51 3/4	12-9 3/8	10	25455	545

*Model numbers denote nominal tons using R-22 at 105°F condensing temperature, +40°F suction temperature, and 78°F wet bulb. R-717 tons are at 96.3°F condensing temperature, +20°F suction temperature, and 78°F wet bulb.

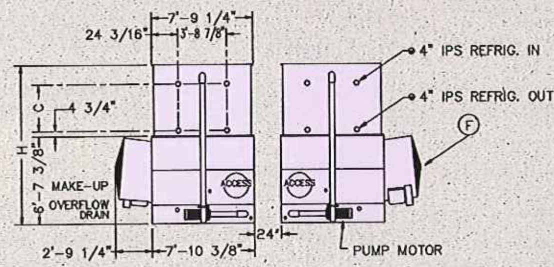
All dimensions are approximate and are not to be used for construction for which certified prints will be furnished.

See page 13 for notes.

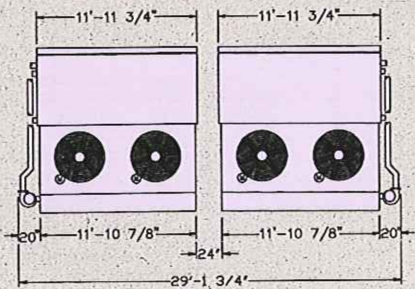
Engineering Data for VSA Units



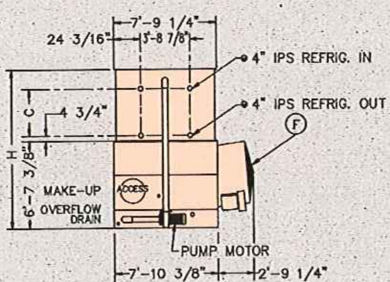
VSA-522 thru VSA-646



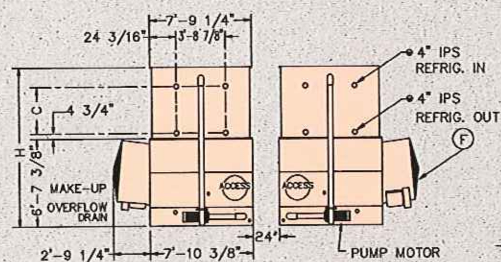
VSA-1044 thru VSA-1292



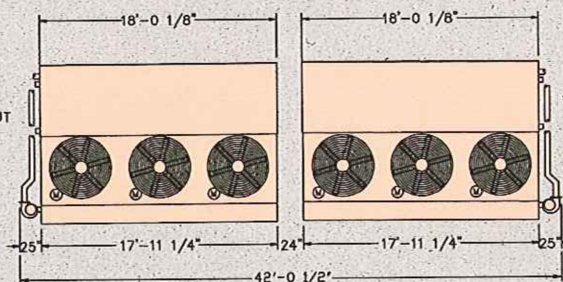
VSA-522 thru VSA-646
VSA-1044 thru VSA-1292



VSA-630 thru VSA-982



VSA-1260 thru VSA-1964



VSA-630 thru VSA-982
VSA-1260 thru VSA-1964

Note: Ⓕ **Fan section assemblies ship loose for field installation**

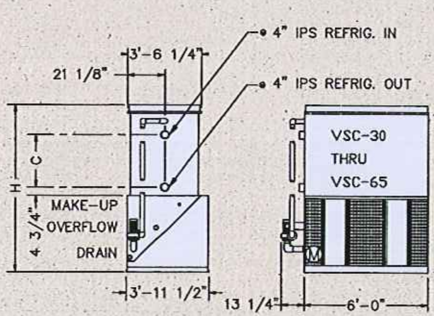
General Information												Remote Sump Data		
Model Number*	R-717 Tons*	Fan CFM	Fan HP @ 0" static	Water Flow GPM	Water Pump HP	R-717 Oper. Charge lbs.	Heaviest Section lbs.	Apprx. Oper. Weight lbs.	Apprx. Ship. Weight lbs.	Coil Center (C) in.	Overall Height (H) ft.-in.	Drain Size in.	Apprx. Oper. Weight lbs.	Gal. Req.
VSA-522	370	86800	(4) 5	770	(2) 3	720	8460	31550	24910	42 1/2	12-0 1/8	8	30890	730
VSA-578	410	99360	(4) 7.5	770	(2) 3	720	8460	31670	25030	42 1/2	12-0 1/8	8	31010	730
VSA-602	426	97100	(4) 7.5	770	(2) 3	860	9860	34750	27830	51 3/4	12-9 3/8	8	34090	730
VSA-646	458	106880	(4) 10	770	(2) 3	860	9860	34790	27870	51 3/4	12-9 3/8	8	34130	730
VSA-630	446	114140	(6) 3	1160	(2) 5	870	10390	42090	32510	33 1/4	11-2 7/8	10	40970	1090
VSA-712	504	135300	(6) 5	1160	(2) 5	870	10390	42210	32630	33 1/4	11-2 7/8	10	41090	1090
VSA-792	562	131400	(6) 5	1160	(2) 5	1080	12570	46990	36990	42 1/2	12-0 1/8	10	45870	1090
VSA-872	620	150420	(6) 7.5	1160	(2) 5	1080	12570	47170	37170	42 1/2	12-0 1/8	10	46050	1090
VSA-982	696	160980	(6) 10	1160	(2) 5	1290	14750	52030	41590	51 3/4	12-9 3/8	10	50910	1090
VSA-1044	740	173600	(8) 5	1540	(4) 3	1440	8460	63100	49820	42 1/2	12-0 1/8	8	61780	1460
VSA-1156	820	198720	(8) 7.5	1540	(4) 3	1440	8460	63340	50060	42 1/2	12-0 1/8	8	62020	1460
VSA-1204	852	194200	(8) 7.5	1540	(4) 3	1720	9860	69500	55660	51 3/4	12-9 3/8	8	68180	1460
VSA-1292	916	213760	(8) 10	1540	(4) 3	1720	9860	69580	55740	51 3/4	12-9 3/8	8	68260	1460
VSA-1260	892	228280	(12) 3	2320	(4) 5	1740	10390	84180	65020	33 1/4	11-2 7/8	10	81940	2180
VSA-1424	1008	270600	(12) 5	2320	(4) 5	1740	10390	84420	65260	33 1/4	11-2 7/8	10	82180	2180
VSA-1584	1124	262800	(12) 5	2320	(4) 5	2160	12570	93980	73980	42 1/2	12-0 1/8	10	91740	2180
VSA-1744	1240	300840	(12) 7.5	2320	(4) 5	2160	12570	94340	74340	42 1/2	12-0 1/8	10	92100	2180
VSA-1964	1392	321960	(12) 10	2320	(4) 5	2580	14750	104060	83180	51 3/4	12-9 3/8	10	101820	2180

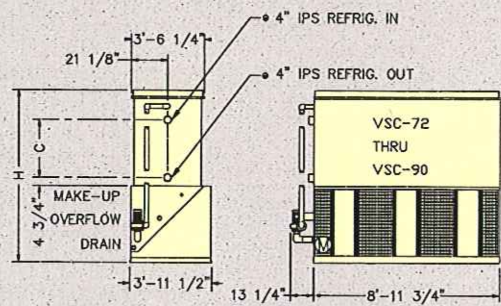
*Model numbers denote nominal tons using R-22 at 105°F condensing temperature, +40°F suction temperature, and 78°F wet bulb. R-717 tons are at 96.3°F condensing temperature, +20°F suction temperature, and 78°F wet bulb.

All dimensions are approximate and are not to be used for construction for which certified prints will be furnished.

See page 13 for notes.

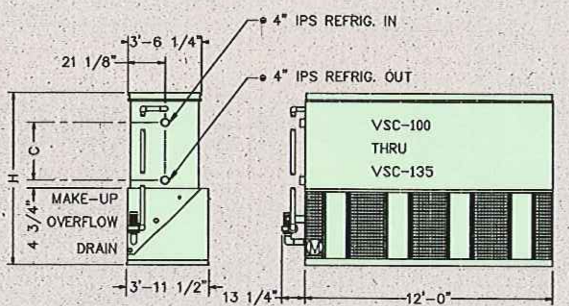
Engineering Data for VSC Units

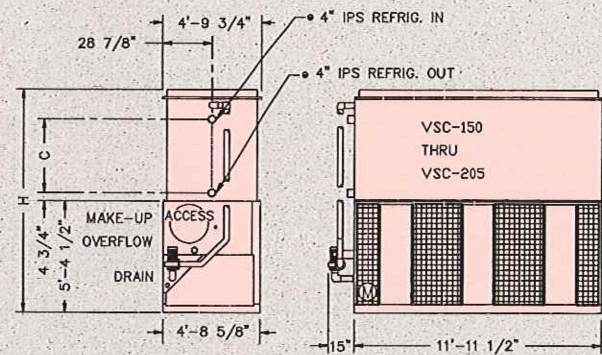




Ⓜ Fan Motor Location

Note: Sufficient space must be provided for entry to access doors located on opposite side of air inlet side.





General Information												Remote Sump Data		
Model Number*	R-717 Tons*	Fan CFM	Fan HP @ 0" static	Water Flow GPM	Water Pump HP	R-717 Oper. Charge lbs.	Heaviest Section lbs.	Apprx. Oper. Weight lbs.	Apprx. Ship. Weight lbs.	Coil Center (C) in.	Overall Height (H) ft.-in.	Drain Size in.	Apprx. Oper. Weight lbs.	Gal. Req.
VSC-30	21	8200	3	75	.5	35	2010†	2300	2010	13 1/4	6-7 1/4	3	1990	50
VSC-38	27	8900	3	75	.5	45	2240†	2560	2240	21 3/4	7-3 3/4	3	2250	50
VSC-46	33	8500	3	75	.5	61	1650	2880	2540	30 1/4	8-0 1/4	3	2570	50
VSC-52	37	10200	5	75	.5	65	1700	2930	2590	30 1/4	8-0 1/4	3	2620	50
VSC-58	41	9800	5	75	.5	76	1940	3230	2860	38 3/4	8-8 3/4	3	2920	50
VSC-65	46	11600	7.5	75	.5	80	2010	3300	2930	38 3/4	8-8 3/4	3	2990	50
VSC-72	51	12300	5	115	.75	90	2400	4210	3510	33 1/4	8-3 1/4	4	3770	75
VSC-80	57	14500	7.5	115	.75	100	2470	4280	3580	33 1/4	8-3 1/4	4	3840	75
VSC-90	64	14000	7.5	115	.75	110	2850	4750	4000	42 1/2	9-0 1/2	4	4310	75
VSC-100	71	19600	7.5	150	1	120	3060	5420	4450	33 1/4	8-3 1/4	4	4830	105
VSC-110	78	22000	10	150	1	130	3140	5500	4530	33 1/4	8-3 1/4	4	4910	105
VSC-125	89	21000	10	150	1	145	3640	6080	5060	42 1/2	9-0 1/2	4	5490	105
VSC-135	96	23000	15	150	1	145	3640	6100	5180	42 1/2	9-0 1/2	4	5570	105
VSC-150	106	28200	10	220	1.5	170	4920	8730	7480	33 1/4	9-11 5/8	6	7880	140
VSC-165	117	27200	10	220	1.5	210	5830	9680	8060	42 1/2	10-8 7/8	6	8830	140
VSC-185	131	33300	15	220	1.5	230	5930	9770	8170	42 1/2	10-8 7/8	6	8920	140
VSC-205	145	35800	20	220	1.5	245	6580	10420	8820	51 3/4	11-6 1/8	6	9570	140

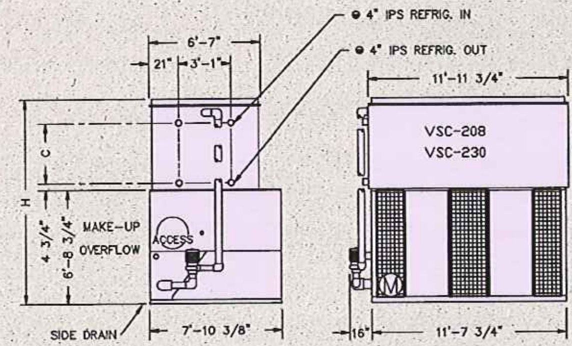
*Model numbers denote nominal tons using R-22 at 105°F condensing temperature, +40°F suction temperature, and 78°F wet bulb. R-717 tons are at 96.3°F condensing temperature, +20°F suction temperature, and 78°F wet bulb.

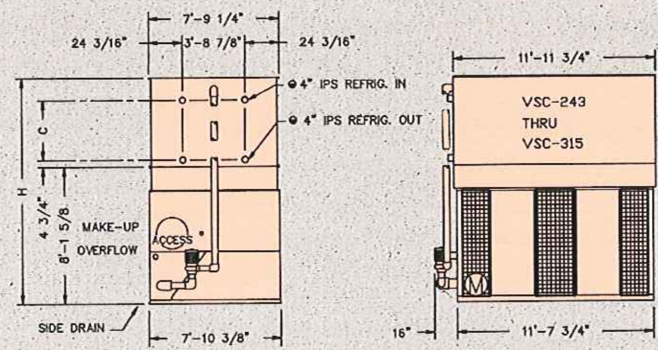
†Unit ships in one piece.

All dimensions are approximate and are not to be used for construction for which certified prints will be furnished.

See page 13 for notes.

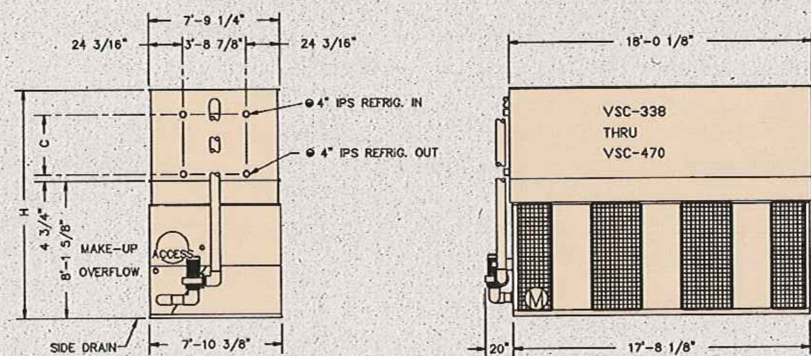
Engineering Data for VSC Units





Ⓜ Fan Motor Location

Note: Sufficient space must be provided for entry to access doors located on opposite side of air inlet side.



General Information											Remote Sump Data		
Model Number*	R-717 Tons*	Fan CFM	Fan HP @ 0" static	Water Flow GPM	Water Pump HP	R-717 Oper. Charge lbs.	Heaviest Section lbs.	Apprx. Oper. Weight lbs.	Apprx. Ship. Weight lbs.	Coil Center (C) in.	Overall Height (H) ft.-in.	Drain Size in.	Apprx. Oper. Weight lbs.	Gal. Req.
VSC-208	148	39650	15	305	2	230	6580	13710	10170	33 1/4	11-3 7/8	6	11460	360
VSC-230	163	38550	15	305	2	245	8220	15000	11410	42 1/2	12-1 1/8	6	12750	360
VSC-243	172	46150	20	385	3	290	7050	15140	10720	33 1/4	12-9 1/8	6	13040	360
VSC-257	182	49700	25	385	3	290	7050	15190	10770	33 1/4	12-9 1/8	6	13090	360
VSC-275	195	44800	20	385	3	360	8460	16700	12130	42 1/2	13-6 3/8	6	14600	360
VSC-301	213	47150	25	385	3	430	9860	18210	13580	51 3/4	14-3 5/8	6	16110	360
VSC-315	223	50100	30	385	3	430	9860	18230	13600	51 3/4	14-3 5/8	6	16130	360
VSC-338	240	60450	20	580	5	435	10390	22360	15630	33 1/4	12-9 1/8	8	19110	520
VSC-357	253	65100	25	580	5	435	10390	22410	15680	33 1/4	12-9 1/8	8	19160	520
VSC-373	265	69200	30	580	5	435	10390	22430	15700	33 1/4	12-9 1/8	8	19180	520
VSC-417	296	67200	30	580	5	540	12570	24820	17880	42 1/2	13-6 3/8	8	21570	520
VSC-470	333	72250	40	580	5	645	14750	27410	20250	51 3/4	14-3 5/8	8	24160	520

*Model numbers denote nominal tons using R-22 at 105°F condensing temperature, +40°F suction temperature, and 78°F wet bulb. R-717 tons are at 96.3°F condensing temperature, +20°F suction temperature, and 78°F wet bulb.

All dimensions are approximate and are not to be used for construction for which certified prints will be furnished.

Notes for all units:

- All operating weights given are based on the total unit weight, refrigerant charge, and sump filled to overflow level.
- Gallons required is water in suspension in unit plus water in pan at remote sump level.
- For other refrigerant charge weights, Multiply R-717 weight x 1.93 for R-22. For R-134a multiply x 1.98. Contact Vilter for other refrigerants.

Construction Details

Coil Module

The coil module is factory assembled and consists of the condensing coil, an efficient water distribution spray system and drift eliminators, all contained within a heavy gauge G235 galvanized steel enclosure.

All principal structural panels are fabricated with double-brake flanges to provide higher structural rigidity and strength with a more reliable sealing surface resulting in watertight joints.

Condensing Coil

The staggered serpentine coil is a prime surface continuous length coil circuited to facilitate efficient heat transfer and condensate drainage with low pressure drop. The coil has a design pressure of 280 psig. The coil test is performed using two methods — an encircling eddy current system and a pneumatic pressure test @ 350 psig under water. The coil is supported by a steel framework and hot dipped galvanized after fabrication.

Water System

The water distribution spray system consists of a galvanized main header and schedule 40 PVC spray branches which contain large diameter, non-clog 360° PVC spray nozzles. The spray nozzles are oriented to provide optimum coil wetting for all conditions. All components of the water spray system are readily accessible and permit easy removal for maintenance.

Drift Eliminators

The eliminators are fabricated from a specially formulated PVC to minimize the effects of ultraviolet light. The eliminators have three changes in air direction and incorporate an air deceleration zone to limit drift losses to less than .002% of the total water circulated. The orientation of the eliminators is such to direct the discharge air away from the fan air inlets.

Sump & Fan Module

This module contains the fans, water sump, sump strainer, and water pump configured for a blow through arrangement. All of the structural members and casing panels are a heavy gauge G235 galvanized steel. All principal sump and fan module-casing panels are fabricated with double-brake flanges to provide maximum structural rigidity and integrity which allow a more reliable sealing surface and watertight joints.

VSA Fans (Axial)

The fans are an efficient two-stage airfoil propeller design selected for low noise and variable rpm.

VSC Fans (Centrifugal)

The fans are balanced forward curved, mounted in specially designed housings for smooth air entry.

Fan Motors

The standard condenser motors are belt driven at low rpm and selected for use with a variable frequency drive. Motor enclosures are TEFC design with a 1.15 service factor.

Water Pumps

The water pumps are a close-coupled, bronze-fitted centrifugal pump with a mechanical seal. The standard condenser includes the integral pump/motor and is factory mounted and piped. For remote sump applications the pump is deleted and an oversized sump drain is provided. Selection of the remote pump will be determined by the elevation required and the spray system minimum pressure.

Sump Strainer

The sump strainer construction is perforated 304 stainless steel and is a lightweight, yet strong, anti-vortex design to prevent pump cavitation at low water levels.

Bleed Line

The bleed line is provided with a metering valve to control the water bleed rate and is installed between the pump discharge and the overflow connection.

Water Level Control

The standard water level control is a brass float valve actuated by a large diameter polystyrene filled, plastic float which has an adjustable rod.

Access Door

The circular, gasketed access door is located conveniently for inspection and service of the sump and interior components.

Personnel Protection

All rotating components are fitted with a protective guard which complies with OSHA requirements.

Optional Construction & Accessories

ASME Coils

ASME coils can be provided when the owners or designers prefer the reassurance that the coil is designed to an accepted standard - ASME Section VIII, Div. II. When the coil is specified with this option the coil will meet the requirements of ASME and will bear the ASME "U" stamp.

The coil design is reviewed, approved and the materials of construction are fully traceable from their source. All welds are performed by qualified ASME welders. An authorized ASME inspector reviews the calculations, inspects the welds and witnesses the coil test.

304 Stainless Steel Construction

Where special consideration is required for corrosion control two options are available for condenser construction. The units may be provided with 304SS water sumps only or primarily fabricated from 304SS material.

For either of these optional methods the coil assembly will be constructed of steel tubes hot dip galvanized after fabrication with galvanized fan cylinders on VSA models.

Electric Sump Level Control

This option is available when an electronic level control is desired. This option replaces the mechanical float switch.

The water level control is performed by an electrical conductance-actuated probe and operates a slow-closing solenoid valve which is shipped loose for field installation.

Sump Heater Packages

The sump heater package is available for two ambient conditions: 0° F & -20° F. Either package consists of high-watt-density three bladed heater elements, thermostats and a low water level safety switch.

The heater elements, operating on 200-volt to 500-volt singe or three phase power, are sized to provide a +40° F sump temperature in the respective ambient with a 10 mph wind speed. All components are watertight and factory mounted.

Remote Sump Operation

For remote operation the water spray pump is deleted and an oversized drain connection is provided.

The remote spray pump is supplied by others and selected and installed to provide the required flow at the required head plus 2 psi for the spray system.

Access Ladders & Railings

Access ladders are constructed of aluminum and extend from the unit base to the top. Safety cages are required by OSHA when the ladders exceed 20 feet in height.

Safety railings are available for the unit top perimeter and consist of galvanized pipe 42 inches high for service personnel protection. These options are factory supplied upon request and are shipped loose for field installation.

High Side Float Kits

For the ultimate in efficient condenser operation Vilter offers high side float kits. These are sized for the specific operating conditions and promote complete condenser drainage and full utilization of the heat transfer surface.

Each condenser coil will be individually drained by a high side float into a common lower pressure liquid drain header. This drain header is connected to the inlet of a controlled pressure receiver, or low pressure pump receiver.

Explosion Proof Motors

Explosion proof motors are available upon request. Contact the Vilter home office for details.

Annual Operation

A prime consideration in operating evaporative condensers year-round is to provide water freeze protection. A satisfactory method employs a remote water sump located indoors, where the temperature is maintained above freezing.

During normal operation the water pump circulates the water to the spray distribution system and recirculates the water as required. When the condensing pressure reaches a minimum the pump is shut off and the water drains down into the remote sump. However, the water is immediately available if the discharge pressure should increase.

The indoor remote sump should be sized to accommodate the suction head requirements of the pump and the water volume in suspension while providing some surge volume. The water level control will maintain the minimum operating level based on evaporation and bleed rate flow.

The recirculating pump must be sized for the required water flow at the total head which includes the elevation change, pipe friction (in supply lines) plus 2.0 psi for the spray system. Good installation practice would dictate that a valve should be installed in the pump discharge line to balance flow rates.

Where an indoor remote sump is not practical, electric sump heaters are available as an option.

Water Treatment

During operation some water will evaporate while the dissolved solids (minerals, etc.) remain in suspension. Without any bleed arrangements or chemical treatment the dissolved solids concentrate rapidly and cause scale buildup and corrosion. In addition, biological growth may occur and lead to further problems.

In many cases the bleed rate will be adequate for control of scale, but biological growth and/or corrosion may necessitate that a regular water treatment program be in place.

No matter what method is employed it is imperative that the water treatment chemicals be compatible with the materials used and control of the water pH must be maintained.

Acid water treatment is not recommended for units constructed from G-235 galvanized steel.

To control these effects it is highly recommended that a competent water treatment company be consulted.

Safety

Safety precautions should be taken which are appropriate for the installation and location of these units and should protect the premises and public from possible injury.

Only qualified personnel should attempt to perform maintenance, operation or repairs on this equipment. Care should be taken to ensure that the appropriate tools are used and proper procedures are followed to prevent personal injury or property damage.

Freeze Protection

This equipment must be protected from damage or reduced performance as a result of water freezing.

Mechanical or operational matters related to this should be directed to Vilter.

To ensure performance of the evaporative condenser at the specified operating conditions, it is necessary to provide adequate installation area for proper air supply without restriction or interference from adjacent structures. Proper piping practices must be adhered to for sufficient gravity drainage.

Location

Discharge air recirculation into the unit air inlets is a leading cause of condenser capacity deficiency. The exiting air is at saturation and the introduction of moist air into the air inlets raises the entering wet bulb temperature and consequently lowers the unit rated heat rejection.

Air make-up or ventilating systems should not be located near the unit discharge since the close proximity may allow discharge air to enter the occupied buildings. Particular attention should be paid to nearby vertical walls which may impede the air flow patterns.

Piping

The installed piping should be adequately sized for the appropriate operating conditions that may be encountered. Special attention is required pertaining to the design of the liquid drain lines from the condenser and the equalizing line. The liquid drain lines should be individually trapped to provide a liquid seal at a sufficient elevation difference to compensate for differing pressure losses between coils.

Of a similar nature is that of the equalizing line between the receiver and the condenser refrigerant inlets. If the receiver vapor pressure cannot equalize with the condenser inlet pressure, the resulting pressure in the receiver can be higher and restrict gravity drainage. Receivers installed in ambient temperatures higher than the condensing temperature will require larger equalizing lines due to increased vapor flow.

One method which has proven effective at preventing gas binding in the condenser is the use of high side float valves (or liquid drainers). Since the float valve operates on the principle of controlling condensate as it forms, the high side float valve opens whenever there is liquid present. If no liquid is present, the valve is closed and acts as a check valve. This type of condensate management is similar to that of a steam coil in heating operation.

The use of high side floats will require that they discharge into a lower pressure (low pressure receiver) to provide a pressure difference suitable for the float valve capacity.

Since a pressure difference is required for operation, the equalizing line for gravity drainage is not required.

Capacity Control

Capacity control of evaporative condensers becomes necessary whenever the compressor discharge pressure will not meet the system demands. This usually is attributed to the hot gas defrost system and liquid supply pressure.

Standard system practices provide a hot gas supply at some minimum pressure for sizing of the defrost regulators. This establishes the minimum discharge pressure and also fixes the minimum liquid supply pressure to the system.

The discharge pressure must be controlled to maintain this minimum supply pressure.

When the system design accounts for these parameters it is possible to operate the compressors at a substantial reduction in discharge pressure for increased energy savings.

On the standard Vilter condensers the capacity control is accomplished by the use of variable frequency drives (VFD) and inverter duty motors. When capacity control is required the VFD regulates the speed of all fan motors simultaneously. This reduces the air volume with considerable fan motor power energy reduction. The energy relationship follows the fan laws such that the fan volume is directly proportional to the speed of the fan, while the power varies directly with the cube of the speed ratio. Thus at 1/2 speed the air volume is 1/2, and the fan horsepower is $(1/2)^3$ or 1/8 the full speed horsepower.

The VFD is controlled via a pressure transducer which senses discharge pressure. An increase in discharge pressure results in an increased fan speed, while a decrease in discharge pressure will result in a decreased fan speed.

Application & Installation Data (continued)

Pan Heaters

Evaporative condensers that will be exposed to below freezing ambient temperatures require protection to prevent freezing of the pan water when the evaporative condenser is idle. Heaters selected to maintain +40°F pan water temperature afford a simple and inexpensive way of providing such protection. Factory installed electric immersion heaters are available from Vilter for all condenser models.

Immersion Heaters - Electric immersion heaters are factory installed in the evaporative condenser basin. The heaters are controlled by a remote thermostat with the sensing bulb located in the pan. A low water level control, also factory installed, prevents heater operation unless the heater elements are fully submerged.

Support

The recommended support arrangement for VSA/VSC units is two I-beams running the full length of the unit. Besides providing support, the steel also serves to raise the unit above any solid foundation which might restrict air movement or prevent access to the bottom of the unit. The steel support beam must be located directly beneath the unit and extend the full length of the pan section. Support beams and anchor bolts are to be furnished and installed by others. Refer to a Vilter certified print for bolt hole locations.

Beam Size and Length

Beam size should be calculated in accordance with accepted structural practice. Use 70 percent of the total operating weight applied as a uniform load to each beam. The length of the beam must be at least equal to the length of the pan.

Maximum permissible beam deflection and center line distances between bolt holes are tabulated at the right.

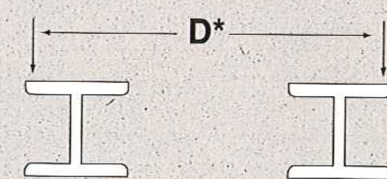
Patents

This equipment is manufactured under one or more of the following U.S. Patents: 3132190, 3198441, 3442494, 3572657, 3575387, 3844682, 4196157, 4540637, 4568022. This equipment is also manufactured under numerous foreign patents and pending United States and foreign applications.

Immersion Heater Total kW Requirements

Model Number	0 °F kW	-20 °F kW	Model Number	0 °F kW	-20 °F kW
VSC 30-65	2.0	2.0	VSA 142-288	5.0	9.0
VSC 72-90	2.0	3.0	VSA 261-323	8.0	10.0
VSC 100-135	3.0	6.0	VSA 315-491	12.0	16.0
VSC 150-205	3.0	6.0	VSA 522-646	16.0	20.0
VSC 208-230	3.0	6.0	VSA 630-982	24.0	32.0
VSC 243-315	5.0	7.5	VSA 1044-1292	32.0	40.0
VSC 338-470	7.0	10.0	VSA 1260-1964	48.0	64.0

Model Numbers are grouped by fan-sump dimensions.



Steel Support Data

Model Number	D* in.	Max. Deflect. in.	Model Number	D* in.	Max. Deflect. in.
VSC 30-65	45-3/8	3/16	VSA 142-211	54-3/4	1/2
VSC 72-90	45-3/8	5/16	VSA 183-288	75-7/8	1/2
VSC 100-135	45-3/8	3/8	VSA 261-323	92-0	1/2
VSC 150-205	54-1/4	3/8	VSA 315-491	92-0	1/2
VSC 208-230	92-3/4	3/8	VSA 522 thru VSA 1964 are multiples of smaller units.		
VSC 243-315	91-5/8	3/8			
VSC 338-470	54-1/4	1/2			

Model Numbers are grouped by fan-sump dimensions.

*Center line distance between bolt holes.

Engineering Specifications for Series VSA and VSC Evaporative Condensers

Evaporative Condenser - Furnish and install, as shown on plans, ________factory assembled evaporative condenser(s) of counterflow blow-through design, with single side air entry. Axial fan assemblies are field mounted, and centrifugal fan units are factory built into the pan with all moving parts factory mounted and aligned.

Principal construction shall be of heavy gauge G235 hot-dipped galvanized steel construction.

Capacity - The evaporative condenser(s) shall have condensing capacity of ________ BTUH heat rejection, operating with _______ refrigerant at ________°F condensing temperature, and ________°F design wet bulb temperature.

Pan/Fan Section - The pan/fan section shall be constructed of heavy gauge galvanized steel. The fans and motors shall be located in the dry entering air stream to provide greater reliability and ease of maintenance. Standard pan accessories shall include circular doors, large area lift-out strainer of anti-vortexing design, and brass make-up valve with large diameter polystyrene filled plastic float arranged for easy adjustment.

VSC Models - The forwardly curved centrifugal fans shall be statically and dynamically balanced. Fan housings shall have curved inlet rings for efficient air entry, and rectangular discharge cowls shall extend into the pan to increase fan efficiency and prevent water from entering the fans. Fans shall be mounted on a steel fan shaft supported by heavy-duty, self-aligning, relubricatable bearings with cast iron housings.

VSA Models - The multi-stage axial flow fans shall be statically balanced. Fan cylinders shall have curved inlets for efficient air entry. Each fan cylinder assembly shall contain two axial flow fans mounted in series on a common shaft, with discharge guide vanes between the fans for increased fan efficiency. Fan shaft shall be mounted in heavy-duty grease-packed self-aligning relubricatable ball bearings with eccentric locking collars.

Fan Motor and Drive - _______ hp,_______ rpm totally-enclosed fan-cooled ball bearing fan motor(s) with 1.15 service factor shall be furnished. Motor(s) shall be suitable for outdoor service on ______volt, _________ hertz, _________ phase electrical service. Each motor shall be located on an easily adjusted heavy-duty motor base. V-belt fan drive(s) shall be designed for not less than 150% of motor nameplate horsepower. Drive(s) and all moving parts shall be protected by removable hot-dip galvanized screens and panels.

Coil Section - The heat transfer casing section(s) shall be removable from the fan-pan section to facilitate rigging. Each section shall include the condensing coil below a 360° spray-type water distribution, all encased by galvanized steel panels.

The condensing coil(s) shall be all prime surface steel, have a design pressure of 280 psig, be tested at 350 psig air pressure under water and hot-dip galvanized after fabrication. The coil(s) shall be designed for low pressure drop with sloping tubes for free drainage of liquid refrigerant.

Water Distribution System - Water shall be distributed uniformly over the condensing coils at a minimum flow rate of 4.5 gpm/sq. ft. of coil cross-section to ensure complete wetting of the coil at all times. The system shall consist of galvanized header and Schedule 40 PVC spray branches with 360° plastic distribution nozzles having a minimum opening of 3/4" x 5/16". The branches and spray nozzles shall be held in place by snap-in rubber grommets providing quick removal of individual nozzles or complete branches for cleaning or flushing.

Water Recirculating Pump - A close coupled, bronze fitted centrifugal pump equipped with a mechanical seal, shall be mounted on the pan and completely piped to the suction strainer and water distribution system. It shall be installed so that it can drain freely when the pan is drained. ______ hp pump motor(s) shall be furnished for operation on ______ volt, ______ hertz, ________ phase electrical service.

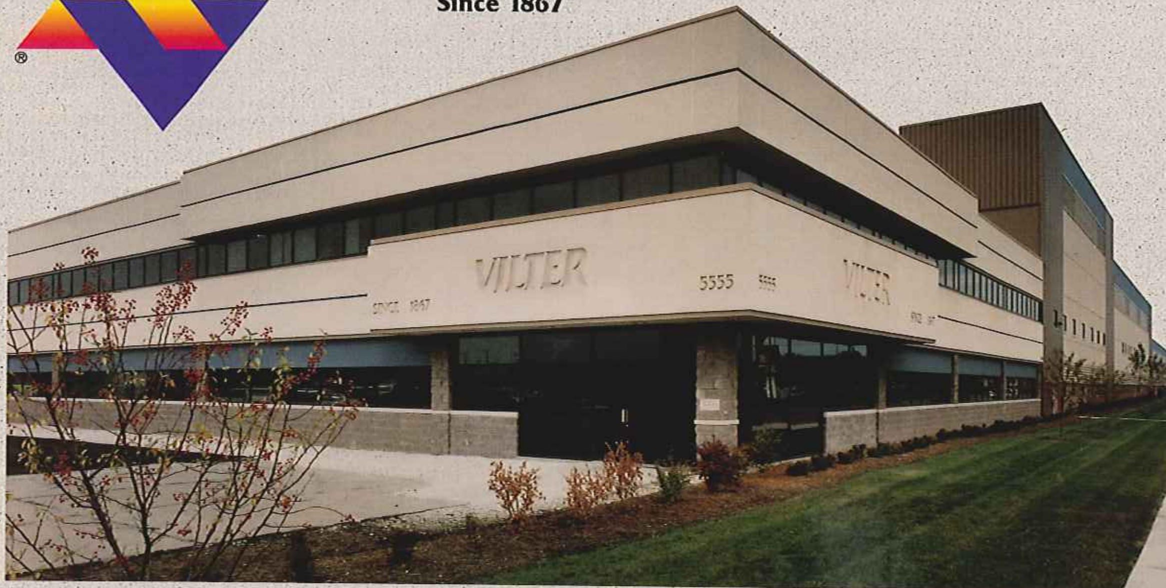
Eliminators - Eliminators shall be constructed of specially formulated PVC and be removable in easily handled sections. They shall have a minimum of three changes in air direction with an air deceleration zone to direct discharge air away from the fans and limit drift loss to less than 0.002% of the total water circulated.

Unit Size - Overall dimensions shall not exceed approximately ________feet X______ feet with an overall height not exceeding approximately _______ feet. The operating weight shall not exceed ________ lbs.

The evaporative condenser shall be Vilter Mfg. Corporation Model ________________.

Warranty - Please inquire as to the Limitation of Warranties applicable to and in effect at the time of the sale/purchase of these products.

Vilter Mfg. Corporation reserves the right to change construction details without cost or obligation of notification.



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Worldwide

Bulletin No. 9850
Printed in U.S.A.

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