Baltimore Aircoil Company Condenser 170	
Mfg: Baltimore Aircoil Company	**Model: VC2-N170**
Stock No. EMSC03.70	**Serial No. 0503801**

1998 Baltimore Aircoil Company Condenser . Model VC2-N170, S/N 0503801.

R-717 Refrigerant Table

Cooling Capacity of Standard Models at Common Conditions Capacity in nominal evaporator tons and total heat rejection in thousands of BTU/hr (MBH) based on R-717 (ammonia) refrigerant at 96.3°F condensing temperature, +20°F saturated suction temperature, and various wet bulb temperatures.

Model	Tons @ 70 WB	MBH @ 70 WB	Tons @ 75 WB	MBH @ 75 WB	Tons @ 78 WB	MBH @ 78 WB	Tons @ 80 WB	MBH @ 80 WB
VC2-N170	160.8	2,452.4	136.4	2,079.0	120.6	1,837.5	109.5	1,668.2

R-22 Refrigerant Table
Cooling Capacity of Standard Models at Common Conditions Capacity in nominal evaporator tons and total heat rejection in thousands of BTU/hr (MBH) based on R-22 refrigerant at 96.3°F condensing temperature, +20°F saturated suction temperature, and various wet bulb temperatures.

Model	Tons @ 70 WB	MBH @ 70 WB	Tons @ 75 WB	MBH @ 75 WB	Tons @ 78 WB	MBH @ 78 WB	Tons @ 80 WB	MBH @ 80 WB
VC2-N170	205.0	3,010.8	183.0	2,687.1	170.0	2,499.0	159.0	2,335.5

Engineering Data for Series V Evaporative Condensers

Model	Fan Motor HP	Pump Motor HP	Shipping Weight	Operating Weight	Heaviest Section	Length	Width	Height
VC2-N170	7-1/2	1-1/2	8,120	9,930	5,930	11' 11-1/2"	4' 11-3/4"	140-3/8":

ISO 9001 COMPANY

SERIES V
EVAPORATIVE CONDENSERS

COOLING TOWERS

EVAPORATIVE CONDENSERS

CLOSED CIRCUIT COOLING

THERMAL STORAGE

B.A.C.® Baltimore Aircoil

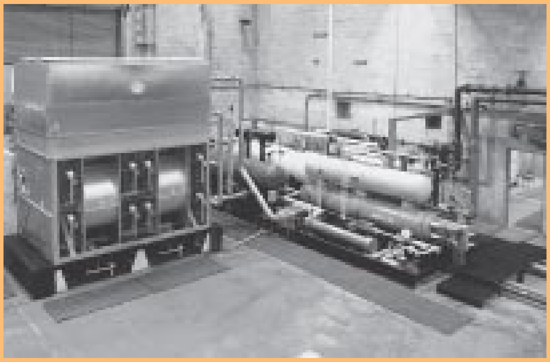
Bulletin S119/1-OB

Leading the Refrigeration Industry Through Engineering and Experience

Corporate Headquarters: Baltimore

Since its founding in 1938, Baltimore Aircoil Company has specialized in the design and manufacture of evaporative cooling equipment, and has become a worldwide leader in this field. B.A.C.'s continuing program of engineering research has resulted in many evaporative condenser design innovations, including the introduction of the V-Line Evaporative Condenser in 1968 which has become the standard of the refrigeration industry.

Evaporative condenser research and product development programs are conducted at the world's largest Evaporative Condenser Test Facility located at the Corporate Research and Development Laboratory. Here, B.A.C. engineers and technicians can simulate the broad range of environmental and system operating conditions that are encountered by units in actual use. Tests are conducted on equipment ranging in size from small prototype modules used in conceptual development up through full-scale field-erected units.



Evaporative Condenser Test Facility

Research & Development Laboratories

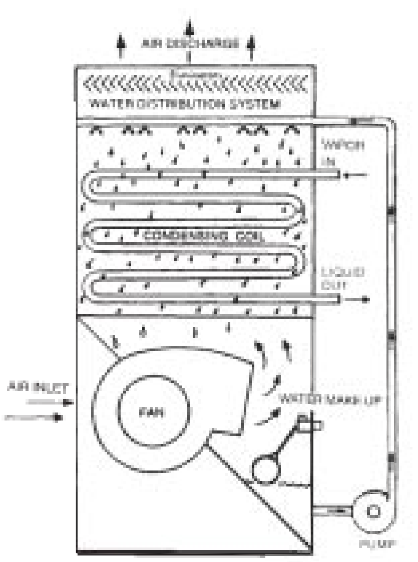
The Series V Evaporative Condenser design is only one of the many results of B.A.C.'s commitment to product innovation through engineering research. A corporate commitment to an aggressive research and development program assures the industry that the most up to date improvements have been built into the Series V design to meet the needs of today's refrigeration and air-conditioning systems.

Series V Evaporative Condensers

... for vapor condensing in mechanical refrigeration or industrial process systems with minimum energy requirements and low life cycle costs.

Principle of Operation

The vapor to be condensed is circulated through a condensing coil, which is continually wetted on the outside by a recirculating water system. Air is simultaneously blown upward over the coil, causing a small portion of the recirculated water to evaporate. This evaporation removes heat from the coil, cooling, and condensing the vapor in the coil.



Energy Savings

Evaporative condensers offer energy savings by providing lower system horsepower than conventional air-cooled and water-cooled condensing systems.

Compared to air-cooled systems:

Evaporative condenser capacity is a function of ambient wet bulb temperature while air-cooled condenser capacity is a function of ambient dry bulb temperature. Since design wet bulb temperatures are generally 15° to 20° lower than design dry bulb temperatures, system condensing temperatures using evaporative condensers can be 15° to 20° less, resulting in compressor and system horsepower savings of up to 30 percent.

Compared to shell and tube condenser/cooling tower systems:

The evaporative condenser rejects heat directly to the ambient air in one step of heat transfer. In the shell-and-tube condenser/cooling tower system, heat must be first transferred to the cooling water by the condenser, and then to the atmosphere by the cooling tower. The single heat transfer step in evaporative condensers provides lower condensing temperatures and compressor horsepower savings of up to 15 percent.

Low Life–Cycle Cost

is inherent in B.A.C. Series V Evaporative Condensers. Series V Evaporative Condensers are generally lower in first cost than air-cooled condensers or shell-and-tube condenser/cooling tower systems. The compact design requires less supporting steel and less space than other condensing systems, and factory-assembled sectional construction minimizes costly field erection time. As a result, B.A.C. Series V Evaporative Condensers offer low total installed cost.

Blow-through design, a simplified water distribution system, a proven corrosion protection system and other B.A.C. design features minimize maintenance costs.

Low first cost and low maintenance cost, combined with the energy savings benefits of evaporative condensers, result in lower life-cycle costs than alternative condensing systems.

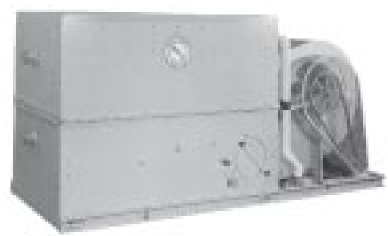
Contents

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.

The B.A.C.® Advantage

Broad Range of Unit Capacities and Styles



Single unit capacities extend in range from 10 tons to 1914 tons, with small capacity increments to permit close matching of unit size to design load. A variety of width and length combinations provides alternative selections to fit layout or horsepower requirements.

The Series V Evaporative Condenser offers the widest selection of units in the industry to meet virtually every installation and application need.

Multi-Stage Axial Fan Units (VC2) – For low energy consumption on normal unrestricted installations.

Multi-Stage Axial Fan, End-Blow Units (VC2-N) – For low energy consumption on installations with special layout considerations.

Centrifugal Fan Units (VC1) – For indoor or restricted outdoor installations and low noise applications.

Containerized, Centrifugal Fan Units (VC1-C) – For export projects, designed to fit into 40 ft. dry van containers.

Centrifugal Fan, Low-Profile Units (VCL) – For compact indoor or restricted outdoor applications.

Low Noise Options

Very Low Sound Levels (VC1 and VCL)

When noise criteria are stringent, VC1 and VCL Evaporative Condensers are the choice to provide minimum sound levels. The centrifugal fans with inherent low noise characteristics will, in most cases, meet the specified sound requirements.

Low Sound Levels (VC2)

The unique lower energy multi-stage, axial-flow design of the VC2 condensers provides low sound levels suitable for most installation noise criteria. The two fans operating in series handle only half the static pressure of a conventional single axial fan, with resultant lower rotative and tip speeds – and lower sound levels.

Directional Capability

In situations where one direction is particularly noise sensitive, the single-fan-side design of Series V Evaporative Condensers allows the quiet back panel side to be oriented toward the noise sensitive direction. In many instances, this procedure eliminates the need for additional acoustical treatment.

Sound Attenuation Available

When even quieter operation is desired, the centrifugal fan Series V Evaporative Condensers (VC1 and VCL models) can be supplied with packaged sound attenuators designed and built by B.A.C. to further reduce sound levels. They are sound tested and rated for the units on which they are used and octave band sound rating data is available for all centrifugal models.

Accurate Sound Data and Noise Evaluation

B.A.C. has sound level data available for all Series V Evaporative Condensers, and has developed in cooperation with a leading sound consultant, a method for evaluating the environmental noise impact of large evaporative cooling equipment.

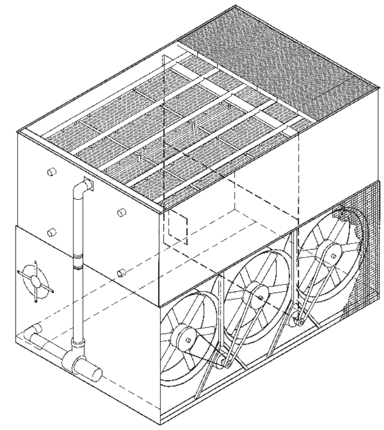
Application Options

The Series V Evaporative Condensers are available with a large variety of options to satisfy the unique needs of individual projects. These options, combined with the broad range of capacities and styles available assures the industry that there is equipment available to meet virtually every application need. The Series V Evaporative Condensers can be provided with the following options.

- Extended Surface Coil
- Heavy Gauge Coil
- ASME U Stamp Coil
- Desuperheater Coil
- Subcooling Coil
- Multiple Circuited Coil
- Independent Fan System
- ENERGY-MISER® Fan System
- Capacity Control Dampers
- Pan Heater Packages
- Electric Water Level Controls
- Sound Attenuation Packages
- Bottom Panels and Screens
- BALTIBOND® Corrosion Protection System
- IOBIO® Bacteria, Slime, and Algae Control

See pages 22–23 for a full description of these options.

Capacity Control



Fan Cycling – VC2 Models

Axial fan units with multiple motors have an internal baffle system with a solid partition that extends vertically through the pan and coil bundle. This system allows individual fan motors to be cycled on and off independently without the harmful effects of air by-pass within the unit.

Independent Fan System – VC2 Models

Axial fan units are available with the Independent Fan System which provides dedicated fan motors (one per fan) and additional internal baffles. Individual fan assemblies can be cycled on and off independently, providing additional capacity control flexibility.

Capacity Control Dampers – VC1 and VCL Models

Centrifugal fan units are available with modulating capacity control dampers to allow for close control of head pressure. These dampers consist of a single airfoil type damper blade located in the discharge of each fan housing. They control head pressure by modulating the airflow through the unit to match the capacity of the evaporative condenser to the load.

Energy Miser Fan System – VC1 and VCL Models

Centrifugal fan units are also available with the Energy Miser Fan System. This system consists of two 1800 RPM motors and drive assembles on either end of the fan shaft. The smaller horsepower is sized for approximately 1/3 of design horsepower and 2/3 fan speed. Control is similar to that of a two-speed, two-winding motor. The system allows more steps of capacity control, improves part load efficiencies and provides standby protection.

Two Speed Fan Motors – All Models

Two speed fan motors are available for both the axial fan and centrifugal fan units, providing an additional step of capacity control.

Variable Frequency Drives – All Models

Both axial fan and centrifugal fan units can be supplied with fan motors suitable for applications with Variable Frequency Drives. A Variable Frequency Drive will modulate fan speed and air flow through the unit to match the capacity of the evaporative condenser to the load.

See page 22 for more unit options with detailed descriptions.

Ease of Maintenance

Few Moving Parts

Less maintenance is an inherent benefit of B.A.C.'s single fan side design because there are a minimum number of fans, bearings, motors, and drives.

All Moving Parts Located at Base of Unit

All moving parts are located near the base of the unit within easy reach for cleaning, lubrication, or adjustments.

Easy access

Large orifice nozzles (shown actual size)

Belt adjustment on Series V units is accomplished by a single threaded bolt and nut assembly accessible from outside the fan assembly. Additionally, the axial fan unit (VC2) features the motors and drives at the front of the unit. Motor and drive maintenance can be performed without having to access the inside of the unit.

Easy Pan Access

Large pan space simplifies cleaning the unit interior – another inherent benefit of single fan side design.

The pan strainer provides a large effective area in a single strong, but lightweight, piece which maintenance personnel can remove for cleaning without entering the sump.

Trouble-Free Water Distribution

The possibility for scale buildup on the coil is reduced because the spray water flow and nozzle spacing have been selected to ensure complete wetting of coil surfaces during all operating conditions. The patented 360° Spray nozzle resists clogging due to the large orifice, and fewer nozzles are required due to the unique spray pattern.

The nozzles and spray branches are grommetted for easy removal.

Construction Details

Coil Section

Typical for all models

The coil section consists of the condensing coil, the water distribution system and the drift eliminators, enclosed in a heavy-gauge, G-235 hot-dip galvanized steel casing. All principal casing panels are formed with double-brake flanges providing maximum strength and rigidity and more reliable sealing at watertight joints.

The condensing coil is all prime surface continuous serpentine steel tubing and is tested at 375 psig air pressure under water. The coil is designed for low pressure drop with sloping tubes for free drainage of the condensed liquid. The coil is encased in a steel framework and the entire assembly is hot-dip galvanized after fabrication.

The water distribution system consists of a galvanized header and schedule 40 PVC spray branches with large diameter, non-clog, 360° plastic spray nozzles oriented for optimum wetting of the coil under all operating conditions. The nozzles, spray branches, and headers are connected by rubber grommets which permit easy removal for cleaning.

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

Pan Section

The pan section is a combination pan and fan arrangement with the fans in a blow-through configuration. All structural elements and steel panels are constructed of heavy-gauge G-235 hot-dip galvanized steel. All principal panels are formed with double-brake flanges for maximum structural integrity.

Circular access doors provide convenient access to the interior of the pan for inspection, adjusting the float valve, cleaning the lift-out strainers, and flushing the sump.

The water pump is a close-coupled, bronze-fitted, centrifugal pump with a mechanical seal. It is factory mounted and completely piped from the suction strainer to the water distribution system.

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

The water makeup valve is a solid brass float valve actuated by a large diameter, polystyrene filled, plastic float, adjustable by means of wingnuts on the float rod.

The strainer is a lightweight, but strong, anti-vortex design which is easily removed for cleaning of the perforated strainer surface.

Standard fan motors are totally-enclosed fan-cooled design with 1.15 service factor. The motors are sheltered from the weather by their location within the unit or a protective motor housing. Other motor types are also available.

Fan bearings on all VCL, VC2, and larger VC1 models have heavy-duty pillow-block type, grease-packed ball bearings with cast iron bodies, ecentric locking collar and easily accessible grease fittings.

Smaller models have one or a combination of a pillow-block type, grease packed ball bearing or spherical, self-aligning, pillow-block type, sleeve bearing.

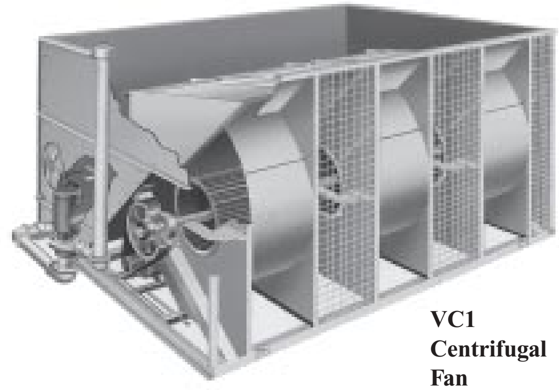
Protection for moving parts is provided by inlet screens on the front of the fan housings, solid panels on the end of each fan section, or by protective motor housings. Screens and panels are easy to remove for access to fans, bearings, motors and drives. Bottom screens, or solid bottom panels, are available if the installation requires this additional protection.

Fan Shafts are solid steel on smaller VC1 models and all VC2 models. Hollow steel shafts with solid end journals are used on larger VC1 models and all VCL models.

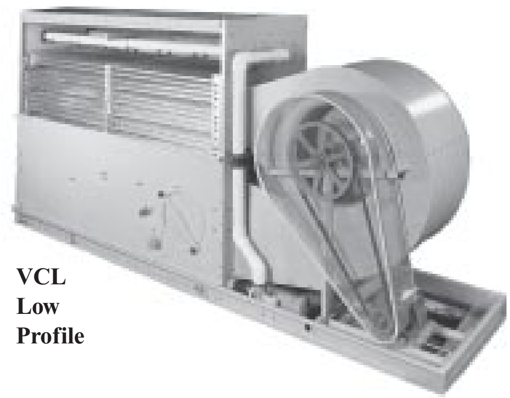
Fan drives on VCL and VC1 models are individual V-belts. Drives on VC2 models are one-piece, multi-groove, banded belts. All drives are designed for not less than 150 percent of motor nameplate horsepower and are adjustable by means of a single threaded-bolt and nut arrangement accessible from outside the fan assembly. Where one motor drives two fan assemblies, the motor base is free to pivot to ensure equal tension on the drive belts of both fans.

VC1 and VCL models are equipped with centrifugal fans that are forwardly curved, statically and dynamically balanced, mounted in special B.A.C. designed housings with curved inlet rings for smooth air entry. Fan discharge cowls mounted to the pan sides minimize static pressure loss for increased fan efficiency and lower horsepower. Air inlet guide vanes improve fan efficiency by preventing pre-rotation of air entering the fans.

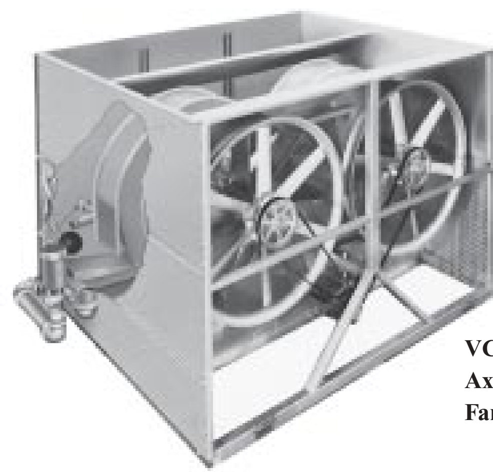
VC2 two-stage, axial-flow fans are mounted in series in a close-fitting cylinder with a smooth contoured inlet ring and intermediate guide vanes to maximize fan efficiency. Each fan operates at one-half the total static pressure, allowing lower fan speeds and more quiet operation than single-stage fans. Fan cylinder extensions inside the pan prevent water from splashing into the fans.



VC1 Centrifugal Fan



VCL Low Profile



VC2 Axial Fan

VC2-N Axial Fan End Blow

Selection

Heat Rejection Method

In a mechanical refrigeration system, the function of an evaporative condenser is to reject heat to the environment. The heat to be rejected is the sum of the heat input at the evaporator and the energy input at the compressor. For a given set of operating conditions, the energy input through the compression process can vary for the several types of compressors – centrifugal, rotary screw, open reciprocating, and hermetic reciprocating. Therefore, in order to accurately determine the proper evaporative condenser required, it is necessary to establish the compressor energy input as well as the heat absorbed in the evaporator.

For Open Compressors:

Total heat rejection = Compressor evaporator capacity (BTUH) + Compressor BHP x 2545

Note: For multi-stage open compressor systems, total heat rejection is calculated from the high stage compressor capacity and brake horsepower, expressed in BTUH.

Hermetic Compressors:

Total heat rejection = Compressor evaporator capacity (BTUH) + Compressor KW x 3415

Selection Procedure:

The base heat rejection of each evaporative condenser is shown in Tables 1, 2, and 3. This represents the total heat rejection of each unit when operating at 105°F condensing temperature and 78°F wet bulb temperature, using refrigerants R-22 or R-134a. Tables 4 and 5 present correction factors to be applied to the system heat rejection for other condensing temperatures, wet bulb temperatures, and refrigerants.

1. Establish total heat rejection required by the system (See above).
2. Determine the refrigerant and design conditions for condensing temperature and wet bulb temperature.
3. Using the appropriate factor (Tables 4 or 5) for the proper refrigerant, determine the correction factor to be applied to the system heat rejection.
4. Multiply the correction factor by the total system heat rejection.
5. Using Table 1, 2, or 3, select the evaporative condenser whose base total heat rejection equals or exceeds the corrected heat rejection calculated in Step 4.

Notes: Consult your B.A.C. Representative for evaporative condenser selections for systems utilizing:

1. Hydrocarbon refrigerants such as propane, butane, or propylene.
2. Centrifugal compressors.
3. Rotary screw compressors with water cooled oil coolers.
4. Ammonia evaporative condensers with desuperheaters.

TABLE 1
Base Heat Rejection – Model VC1

Model Number	Heat Rejection MBH	Model Number	Heat Rejection MBH	Model Number	Heat Rejection MBH
VC1-10	147.0	VC1-N373	5,483.1	VC1-C216	3,175.2
VC1-15	220.5	VC1-N417	6,129.9	VC1-C231	3,395.7
VC1-20	294.0	VC1-N470	6,909.0	VC1-C242	3,557.4
VC1-25	367.5	VC1-386	5,674.2	VC1-C260	3,822.0
VC1-30	441.0	VC1-436	6,409.2	VC1-C274	4,027.8
VC1-38	558.6	VC1-467	6,864.9	VC1-C286	4,204.2
VC1-46	676.2	VC1-454	6,673.8	VC1-C299	4,395.3
VC1-52	764.4	VC1-487	7,158.9	VC1-C320	4,704.0
VC1-58	852.6	VC1-516	7,585.2	VC1-C339	4,983.3
VC1-65	955.5	VC1-540	7,938.0	VC1-C354	5,203.8
VC1-72	1,058.4	VC1-579	8,511.3	VC1-C380	5,586.0
VC1-80	1,176.0	VC1-612	8,996.4	VC1-C396	5,821.2
VC1-90	1,323.0	VC1-646	9,496.2	VC1-C424	6,232.8
VC1-100	1,470.0	VC1-683	10,040.1	VC1-C445	6,541.5
VC1-110	1,617.0	VC1-715	10,510.5	VC1-C469	6,894.3
VC1-125	1,837.5	VC1-748	10,995.6		
VC1-135	1,984.5	VC1-804	11,818.8		
VC1-150	2,205.0	VC1-772	11,348.4		
VC1-165	2,425.5	VC1-872	12,818.4		
VC1-185	2,719.5	VC1-934	13,729.8		
VC1-205	3,013.5	VC1-908	13,347.6		
VC1-N208	3,057.6	VC1-974	14,317.8		
VC1-N230	3,381.0	VC1-1032	15,170.4		
VC1-N243	3,572.1	VC1-1158	17,022.6		
VC1-N257	3,777.9	VC1-1224	17,992.8		
VC1-N275	4,042.5	VC1-1366	20,080.2		
VC1-N301	4,424.7	VC1-1430	21,021.0		
VC1-N315	4,630.5	VC1-1496	21,991.2		
VC1-N338	4,968.6	VC1-1608	23,637.6		
VC1-N357	5,247.9				

TABLE 2
Base Heat Rejection – Model VC2

Model Number	Heat Rejection MBH	Model Number	Heat Rejection MBH
VC2-N138	2,028.6	VC2-754	11,083.8
VC2-N150	2,205.0	VC2-785	11,539.5
VC2-N170	2,499.0	VC2-827	12,156.9
VC2-N191	2,807.7	VC2-840	12,348.0
VC2-N206	3,028.2	VC2-N870	12,789.0
VC2-N215	3,160.5	VC2-887	13,038.9
VC2-N235	3,454.5	VC2-895	13,156.5
VC2-N261	3,836.7	VC2-902	13,259.4
VC2-N301	4,424.7	VC2-N932	13,700.4
VC2-N356	5,233.2	VC2-942	13,847.4
VC2-N396	5,821.2	VC2-957	14,067.9
VC2-N416	6,115.2	VC2-982	14,435.4
VC2-N446	6,556.2	VC2-N1000	14,700.0
VC2-319	4,689.3	VC2-1026	15,082.2
VC2-342	5,027.4	VC2-1052	15,464.4
VC2-377	5,541.9	VC2-N1071	15,743.7
VC2-420	6,174.0	VC2-1082	15,905.4
VC2-451	6,629.7	VC2-N1124	16,522.8
VC2-471	6,923.7	VC2-1160	17,052.0
VC2-491	7,217.7	VC2-1162	17,081.4
VC2-513	7,541.1	VC2-1170	17,199.0
VC2-526	7,732.2	VC2-N1204	17,698.8
VC2-541	7,952.7	VC2-1246	18,316.2
VC2-580	8,526.0	VC2-1252	18,404.4
VC2-581	8,540.7	VC2-1284	18,874.8
VC2-585	8,599.5	VC2-1376	20,227.2
VC2-623	9,158.1	VC2-1422	20,903.4
VC2-626	9,202.2	VC2-1504	22,108.8
VC2-642	9,437.4	VC2-1570	23,079.0
VC2-684	10,054.8	VC2-1654	24,313.8
VC2-688	10,113.6	VC2-1774	26,077.8
VC2-711	10,451.7	VC2-1790	26,313.0
VC2-752	11,054.4	VC2-1914	28,135.8

TABLE 3
Base Heat Rejection – Model VCL

Model Number	Heat Rejection MBH
VCL-016	235.2
VCL-019	279.3
VCL-024	352.8
VCL-029	426.3
VCL-035	514.5
VCL-038	558.6
VCL-044	646.8
VCL-048	705.6
VCL-054	793.8
VCL-058	852.6
VCL-065	955.5
VCL-073	1,073.1
VCL-079	1,161.3
VCL-087	1,278.9
VCL-096	1,411.2
VCL-102	1,499.4
VCL-108	1,587.6
VCL-115	1,690.5
VCL-120	1,764.0
VCL-134	1,969.8
VCL-148	2,175.6
VCL-155	2,278.5
VCL-167	2,454.9
VCL-185	2,719.5
VCL-209	3,072.3
VCL-223	3,278.1
VCL-234	3,439.8
VCL-257	3,777.9
VCL-271	3,983.7
VCL-286	4,204.2
VCL-299	4,395.3

Note: These models represent the current standard product line. Contact your B.A.C. Representative for applications with special unit configurations, horsepower requirements, or unique layout considerations for alternate selections.

TABLE 4 Heat Rejection Capacity Factors – R-22, R-134a

Condensing Pressure (PSIG)		Cond. Temp. (°F)	Entering Wet Bulb Temperature (°F)																
R-22	R-134a		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	0.93	0.96	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	0.90	0.93	0.97	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	0.88	0.91	0.94	0.97	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	0.85	0.88	0.91	0.94	0.98	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	111.9	94	0.83	0.85	0.88	0.91	0.95	0.98	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	0.81	0.83	0.86	0.88	0.92	0.95	0.99	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	0.79	0.81	0.83	0.86	0.89	0.92	0.96	1.00	1.05	1.10	1.17	1.24	1.33	1.43	1.56	1.72	1.93
187.4	117.5	97	0.76	0.79	0.81	0.83	0.86	0.89	0.93	0.97	1.01	1.06	1.12	1.18	1.26	1.36	1.47	1.61	1.80
190.2	119.9	98	0.75	0.76	0.79	0.81	0.84	0.86	0.90	0.93	0.97	1.02	1.07	1.13	1.21	1.29	1.39	1.52	1.68
193.0	122.1	99	0.73	0.74	0.77	0.79	0.81	0.84	0.87	0.90	0.94	0.98	1.03	1.09	1.15	1.23	1.32	1.43	1.57
195.9	124.1	100	0.71	0.73	0.74	0.77	0.79	0.81	0.84	0.87	0.91	0.95	0.99	1.04	1.10	1.17	1.26	1.36	1.48
210.7	149.6	105	0.63	0.64	0.66	0.67	0.69	0.71	0.73	0.75	0.77	0.80	0.83	0.87	0.91	0.95	1.00	1.07	1.14
226.4	146.4	110	0.56	0.57	0.58	0.60	0.61	0.62	0.64	0.65	0.67	0.69	0.71	0.74	0.77	0.80	0.83	0.87	0.92

TABLE 5 Heat Rejection Capacity Factors – R-717 (ammonia)

Condensing Pressure (PSIG)	Cond. Temp. (°F)	Entering Wet Bulb Temperature (°F)																
R-717		50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82
151.7	85	0.97	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	0.83	0.86	0.89	0.93	0.97	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	0.80	0.83	0.86	0.90	0.93	0.98	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	0.78	0.81	0.83	0.87	0.90	0.94	0.99	1.04	1.10	1.17	1.25	1.35	1.47	1.62	1.82	2.08	2.44
174.9	93	0.76	0.78	0.81	0.84	0.87	0.91	0.95	1.00	1.05	1.11	1.19	1.28	1.38	1.52	1.69	1.91	2.21
178.0	94	0.74	0.76	0.79	0.81	0.84	0.88	0.92	0.96	1.01	1.07	1.13	1.21	1.31	1.43	1.58	1.77	2.02
181.1	95	0.72	0.74	0.76	0.79	0.82	0.85	0.88	0.92	0.97	1.02	1.08	1.16	1.24	1.35	1.48	1.64	1.86
185.0	96.3	0.69	0.71	0.73	0.76	0.78	0.81	0.84	0.88	0.92	0.97	1.02	1.09	1.16	1.25	1.36	1.50	1.68
187.4	97	0.68	0.70	0.72	0.74	0.77	0.79	0.83	0.86	0.90	0.94	0.99	1.05	1.13	1.21	1.31	1.44	1.60
190.6	98	0.66	0.68	0.70	0.72	0.74	0.77	0.80	0.83	0.87	0.91	0.96	1.01	1.07	1.15	1.24	1.35	1.49
193.9	99	0.65	0.66	0.68	0.70	0.72	0.75	0.77	0.80	0.84	0.87	0.92	0.97	1.03	1.10	1.18	1.28	1.40
197.2	100	0.63	0.65	0.66	0.68	0.70	0.72	0.75	0.78	0.81	0.84	0.88	0.93	0.98	1.05	1.12	1.21	1.32
214.2	105	0.56	0.57	0.58	0.60	0.61	0.63	0.65	0.67	0.69	0.71	0.74	0.77	0.81	0.85	0.89	0.95	1.01
232.3	110	0.50	0.51	0.52	0.53	0.54	0.55	0.57	0.58	0.60	0.62	0.64	0.66	0.68	0.71	0.74	0.78	0.82

Selection Examples

Given: R-22 refrigerant
Compressor evaporator capacity = 80 tons
Compressor KW input = 58 KW
Condensing temperature = 95°F
Wet Bulb temperature = 74°F

Solution:

1. Determine the total heat rejection of the system
   Compressor evaporator capacity = 80 x 12,000 = 960,000 BTUH
   Compressor KW input = 58 x 3415 = 198,070 BTUH
   Total heat rejection = 1,158,070 BTUH
2. Determine the heat rejection capacity factor for R-22 at 95°F condensing temperature and 74°F wet bulb temperature from Table 4 (1.40)
3. Multiply 1,158,070 x 1.40 = 1,621,298 BTUH (1,621.2 MBH).
4. From Table 1, 2, or 3, select a unit with a base total heat rejection equal to or greater than 1,621.2 MBH. In this case select a VC1-125.

Given: R-717 refrigerant
Compressor evaporator capacity = 550 tons
Compressor BHP = 600
Condensing temperature = 95°F
Wet bulb temperature = 76°F

Solution:

1. Determine the total heat rejection of the system
   Compressor evaporator capacity = 550 x 12,000 = 6,600,000 BTUH
   Compressor BHP input = 600 x 2545 = 1,527,000 BTUH
   Total heat rejection = 8,127,000 BTUH
2. Determine the heat rejection capacity factor for R-717 at 95°F condensing temperature and 76°F wet bulb temperature from Table 5 (1.35).
3. Multiply: 8,127,000 x 1.35 = 10,971,450 BTUH (10,971.4 MBH).
4. From Table 1, 2, or 3, select a unit with a base total heat rejection equal to or greater than 10,971.4 MBH. In this case select a VC2-752.

Note: Correction Factors found in Table 4 can also be used for R-12, R-502, and many alternative refrigerants. Contact your B.A.C. Representative for verification of selection procedures using these refrigerants.

Selection

Evaporator Ton Method

The evaporator ton selection method should only be used for selecting evaporative condensers on systems utilizing open reciprocating compressors.

This selection method is based on estimated horsepower requirements for open reciprocating compressors, and cannot be considered to be precise.

Critical selections of this type should be checked by the heat rejection method shown on pages 8 and 9.

Selection Procedure:

1. Determine the evaporator capacity in tons of refrigeration (one ton = 12,000 BTUH).
2. Determine refrigerant and design conditions of condensing temperature, suction temperature, and wet bulb temperature.
3. Using the appropriate table for the system refrigerant (Tables 9 or 10), determine the correction factor for condensing temperature and wet bulb temperature, and the correction factor for suction temperature.
4. Multiply the evaporator capacity (in tons) by the two correction factors determined in Step 3.
5. From Tables 6, 7 or 8, select the evaporative condenser whose model number equals or exceeds the corrected evaporator capacity calculated in Step 4.

Selection Procedure:

(Open reciprocating compressors only)

Given: R-134a refrigerant
Evaporator capacity = 145 tons refrigeration
Condensing temperature = 105°F
Suction temperature = 30°F
Wet bulb temperature = 80°F

Solution:

1. Determine the capacity factor for R-134a at 105°F condensing temperature and 80°F wet bulb temperature from Table 9 (1.07).
2. Determine the suction temperature correction factor for 30°F from Table 9 (1.03)
3. Multiply 145 x 1.07 x 1.03 = 159.8 corrected tons.
4. From Table 6, 7, or 8, select a unit with a base capacity equal to this or larger. In this case, select VC1-165.

Note: Consult your B.A.C. Representative for selection of an evaporative condenser utilizing a desuperheater.

TABLE 6
Base Evaporator Tons – Model VC1

Model Number	Corrected Evaporator Tons	Model Number	Corrected Evaporator Tons
VC1-10	10	VC1-487	487
VC1-15	15	VC1-516	516
VC1-20	20	VC1-540	540
VC1-25	25	VC1-579	579
VC1-30	30	VC1-612	612
VC1-38	38	VC1-646	646
VC1-46	46	VC1-683	683
VC1-52	52	VC1-715	715
VC1-58	58	VC1-748	748
VC1-65	65	VC1-804	804
VC1-72	72	VC1-772	772
VC1-80	80	VC1-872	872
VC1-90	90	VC1-934	934
VC1-100	100	VC1-908	908
VC1-110	110	VC1-974	974
VC1-125	125	VC1-1032	1,032
VC1-135	135	VC1-1158	1,158
VC1-150	150	VC1-1224	1,224
VC1-165	165	VC1-1366	1,366
VC1-185	185	VC1-1430	1,430
VC1-205	205	VC1-1496	1,496
VC1-N208	208	VC1-1608	1,608
VC1-N230	230	VC1-C216	216
VC1-N243	243	VC1-C231	231
VC1-N257	257	VC1-C242	242
VC1-N275	275	VC1-C260	260
VC1-N301	301	VC1-C274	274
VC1-N315	315	VC1-C286	286
VC1-N338	338	VC1-C299	299
VC1-N357	357	VC1-C320	320
VC1-N373	373	VC1-C339	339
VC1-N417	417	VC1-C354	354
VC1-N470	470	VC1-C380	380
VC1-386	386	VC1-C396	396
VC1-436	436	VC1-C424	424
VC1-454	454	VC1-C445	445
VC1-467	467	VC1-C469	469

TABLE 7
Base Evaporator Tons – Model VC2

Model Number	Corrected Evaporator Tons	Model Number	Corrected Evaporator Tons
VC2-N138	138	VC2-754	754
VC2-N150	150	VC2-785	785
VC2-N170	170	VC2-827	827
VC2-N191	191	VC2-840	840
VC2-N206	206	VC2-N870	870
VC2-N215	215	VC2-887	887
VC2-N235	235	VC2-895	895
VC2-N261	261	VC2-902	902
VC2-N301	301	VC2-N932	932
VC2-N356	356	VC2-942	942
VC2-N396	396	VC2-957	957
VC2-N416	416	VC2-982	982
VC2-N446	446	VC2-N1000	1,000
VC2-319	319	VC2-1026	1,026
VC2-342	342	VC2-1052	1,052
VC2-377	377	VC2-N1071	1,071
VC2-420	420	VC2-1082	1,082
VC2-451	451	VC2-N1124	1,124
VC2-471	471	VC2-1160	1,160
VC2-491	491	VC2-1162	1,162
VC2-513	513	VC2-1170	1,170
VC2-526	526	VC2-N1204	1,204
VC2-541	541	VC2-1246	1,246
VC2-580	580	VC2-1252	1,252
VC2-581	581	VC2-1284	1,284
VC2-585	585	VC2-1376	1,376
VC2-623	623	VC2-1422	1,422
VC2-626	626	VC2-1504	1,504
VC2-642	642	VC2-1570	1,570
VC2-684	684	VC2-1654	1,654
VC2-688	688	VC2-1774	1,774
VC2-711	711	VC2-1790	1,790
VC2-752	752	VC2-1914	1,914

TABLE 8
Base Evaporator Tons – Model VCL

Model Number	Corrected Evaporator Tons
VCL-016	16
VCL-019	19
VCL-024	24
VCL-029	29
VCL-035	35
VCL-038	38
VCL-044	44
VCL-048	48
VCL-054	54
VCL-058	58
VCL-065	65
VCL-073	73
VCL-079	79
VCL-087	87
VCL-096	96
VCL-102	102
VCL-108	108
VCL-115	115
VCL-120	120
VCL-134	134
VCL-148	148
VCL-155	155
VCL-167	167
VCL-185	185
VCL-209	209
VCL-223	223
VCL-234	234
VCL-257	257
VCL-271	271
VCL-286	286
VCL-299	299

Note: These models represent the current standard product line. Contact your B.A.C. Representative for applications with special unit configurations, horsepower requirements, or unique layout considerations for alternate selections.

TABLE 9 Evaporator Capacity Factors – R-22, R-134a

Condensing Pressure (PSIG)		Cond. Temp. (°F)	Entering Wet Bulb Temperature (°F)																
R-22	R-134a		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	0.90	0.93	0.96	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	0.87	0.90	0.94	0.97	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	0.85	0.88	0.91	0.94	0.98	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	0.83	0.85	0.88	0.91	0.95	0.99	1.04	1.09	1.15	1.22	1.30	1.39	1.51	1.66	1.84	2.08	2.41
179.1	111.9	94	0.81	0.83	0.86	0.89	0.92	0.96	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	0.79	0.81	0.84	0.86	0.89	0.93	0.97	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	0.77	0.79	0.81	0.84	0.87	0.90	0.94	0.98	1.03	1.08	1.14	1.21	1.30	1.40	1.53	1.68	1.89
187.4	117.5	97	0.75	0.77	0.79	0.82	0.84	0.88	0.91	0.95	0.99	1.04	1.10	1.16	1.24	1.33	1.44	1.58	1.76
190.2	119.9	98	0.73	0.75	0.77	0.80	0.82	0.85	0.88	0.92	0.96	1.00	1.05	1.11	1.19	1.27	1.37	1.49	1.65
193.0	122.1	99	0.72	0.73	0.75	0.78	0.80	0.83	0.86	0.89	0.93	0.97	1.02	1.07	1.14	1.21	1.30	1.41	1.55
195.9	124.1	100	0.70	0.72	0.74	0.76	0.78	0.80	0.83	0.86	0.90	0.94	0.98	1.03	1.09	1.16	1.24	1.34	1.46
210.7	149.6	105	0.63	0.64	0.66	0.67	0.69	0.71	0.73	0.75	0.77	0.80	0.83	0.87	0.91	0.95	1.00	1.07	1.14
226.4	146.4	110	0.57	0.58	0.59	0.60	0.62	0.63	0.65	0.66	0.68	0.70	0.72	0.75	0.78	0.81	0.84	0.88	0.93

Suction Temperature (ºF)	-20	-10	0	+10	+20	+30	+40	+50
Capacity Factor	1.20	1.16	1.13	1.09	1.06	1.03	1.00	0.98

TABLE 10 Evaporator Capacity Factors – R-717 (Ammonia)

Condensing Pressure (PSIG)	Cond. Temp. (°F)	Entering Wet Bulb Temperature (°F)																
R-717		50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82
151.7	85	0.98	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	0.85	0.88	0.91	0.95	0.99	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	0.82	0.85	0.88	0.92	0.95	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	0.80	0.83	0.86	0.89	0.92	0.96	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	0.78	0.81	0.83	0.86	0.90	0.93	0.98	1.02	1.08	1.15	1.22	1.31	1.42	1.56	1.74	1.96	2.27
178.0	94	0.76	0.78	0.81	0.84	0.87	0.90	0.94	0.99	1.04	1.10	1.17	1.25	1.35	1.47	1.62	1.82	2.08
181.1	95	0.74	0.76	0.79	0.81	0.84	0.88	0.91	0.95	1.00	1.06	1.12	1.19	1.28	1.39	1.53	1.70	1.92
185.0	96.3	0.72	0.74	0.76	0.79	0.81	0.84	0.88	0.91	0.96	1.01	1.06	1.13	1.21	1.30	1.41	1.56	1.74
187.4	97	0.71	0.73	0.75	0.77	0.80	0.82	0.86	0.89	0.93	0.98	1.03	1.10	1.17	1.26	1.36	1.49	1.66
190.6	98	0.69	0.71	0.73	0.75	0.77	0.80	0.83	0.86	0.90	0.95	0.99	1.05	1.12	1.20	1.29	1.41	1.55
193.9	99	0.67	0.69	0.71	0.73	0.75	0.78	0.81	0.84	0.87	0.91	0.96	1.01	1.07	1.14	1.23	1.33	1.46
197.2	100	0.66	0.68	0.69	0.71	0.73	0.76	0.78	0.81	0.85	0.88	0.92	0.97	1.03	1.09	1.17	1.26	1.38
214.2	105	0.59	0.61	0.62	0.63	0.65	0.67	0.69	0.71	0.73	0.76	0.79	0.82	0.86	0.9	0.95	1.00	1.07
232.3	110	0.54	0.55	0.56	0.57	0.58	0.59	0.61	0.62	0.64	0.66	0.68	0.71	0.73	0.76	0.79	0.83	0.88

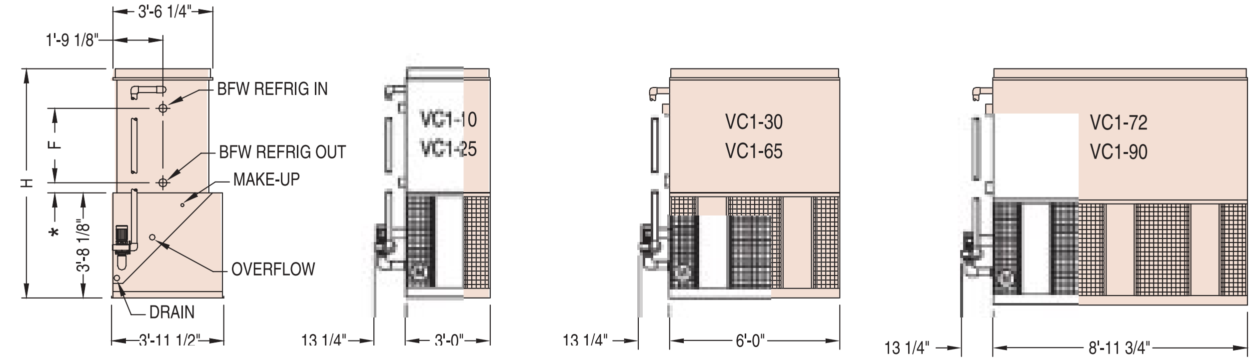
Suction Temperature (ºF)	-20	-10	0	+10	+20	+30	+40	+50
Capacity Factor	1.14	1.11	1.07	1.04	1.00	0.98	0.95	0.93

Note: Correction Factors found in Table 9 can also be used for R-12, R-502, and many alternative refrigerants. Contact your B.A.C. Representative for verification of selection procedures using these refrigerants.

Engineering Data

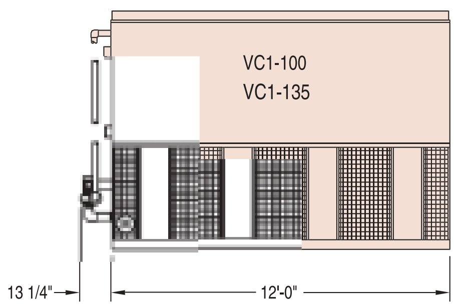
VC1 Centrifugal Fan

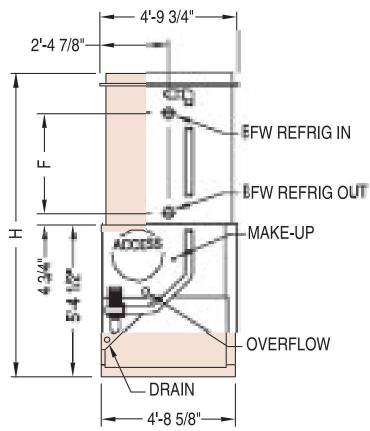
Do not use for construction. Refer to factory certified dimensions.
This brochure includes data current at time of publication, which should be reconfirmed at the time of purchase.

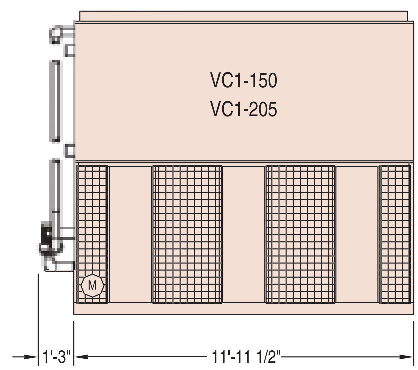


* 4¼" on VC1-10-20
4¾" on VC1-30-135

Note: On Model VC1-10 to135 sufficient space must be provided for entry to access doors located on side opposite air entry side.
Ⓜ Fan Motor Location







Model Number	R-717 Tons	Approx. Shpg. Weight (lbs)	Approx. Oper. Weight (lbs)	Heaviest Section (Coil) (lbs)	CFM	Motor HP (0" ESP)	GPM	Pump Motor HP	R-717 Oper. Charge (lbs)	Internal Coil Volume (ft³)	REMOTE SUMP Drain Size	REMOTE SUMP Approx. Oper. Weight	REMOTE SUMP Gal. Req.	F	H
VC1-10	7	1,270	1,400	* 1,270	2,900	1/2	35	1/3	19	2.1	2 1/2	1,220	25	14 1/4	79 1/4
VC1-15	11	1,460	1,600	* 1,460	3,800	1	35	1/3	25	2.8	2 1/2	1,420	25	22 3/4	87 3/4
VC1-20	14	1,620	1,770	1,000	4,400	1 1/2	35	1/3	32	3.5	2 1/2	1,590	25	31 1/4	96 1/4
VC1-25	18	1,670	1,820	1,050	5,300	3	35	1/3	34	3.5	2 1/2	1,640	25	31 1/4	96 1/4
VC1-30	21	2,010	2,300	* 2,010	8,200	3	75	1/2	35	3.5	3	1,990	50	13 1/4	79 1/4
VC1-38	27	2,240	2,560	* 2,240	8,900	3	75	1/2	45	5.2	3	2,250	50	21 3/4	87 3/4
VC1-46	33	2,540	2,880	1,650	8,500	3	75	1/2	61	6.7	3	2,570	50	30 1/4	96 1/4
VC1-52	37	2,590	2,930	1,700	10,200	5	75	1/2	65	6.7	3	2,620	50	30 1/4	96 1/4
VC1-58	41	2,860	3,230	1,940	9,800	5	75	1/2	76	8.2	3	2,920	50	38 3/4	104 3/4
VC1-65	46	2,930	3,300	2,010	11,600	7 1/2	75	1/2	80	8.2	3	2,990	50	38 3/4	104 3/4
VC1-72	51	3,510	4,210	2,400	12,300	5	115	3/4	90	9.5	4	3,770	75	33 1/4	99 1/4
VC1-80	57	3,580	4,280	2,470	14,500	7 1/2	115	3/4	100	9.5	4	3,840	75	33 1/4	99 1/4
VC1-90	64	4,000	4,750	2,850	14,000	7 1/2	115	3/4	110	12	4	4,310	75	42 1/2	108 1/2
VC1-100	71	4,450	5,420	3,060	19,600	7 1/2	150	1	120	13	4	4,830	105	33 1/4	99 1/4
VC1-110	78	4,530	5,500	3,140	22,000	10	150	1	130	13	4	4,910	105	33 1/4	99 1/4
VC1-125	89	5,060	6,080	3,640	21,000	10	150	1	145	16	4	5,490	105	42 1/2	108 1/2
VC1-135	96	5,180	6,160	3,640	23,000	15	150	1	145	16	4	5,570	105	42 1/2	108 1/2
VC1-150	106	7,480	8,730	4,920	28,200	10	220	1 1/2	170	18	6	7,880	140	33 1/4	119 5/8
VC1-165	117	8,060	9,680	5,830	27,200	10	220	1 1/2	210	22	6	8,830	140	42 1/2	128 7/8
VC1-185	131	8,170	9,770	5,930	33,300	15	220	1 1/2	210	22	6	8,920	140	42 1/2	128 7/8
VC1-205	145	8,820	10,420	6,580	35,800	20	220	1 1/2	245	26	6	9,570	140	51 3/4	138 1/8

* UNIT SHIPS IN ONE PIECE
See next page for notes.

VC1 Centrifugal Fan

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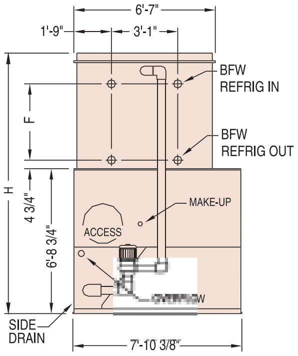

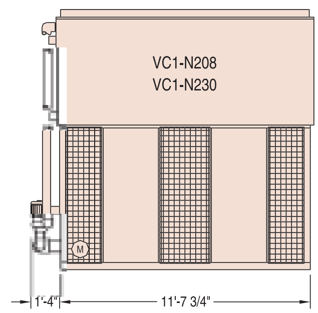

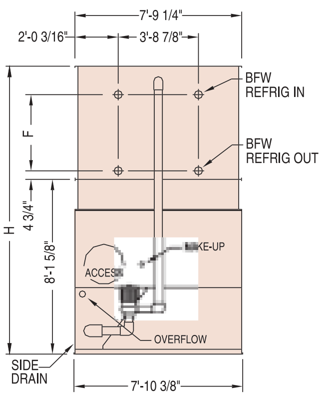

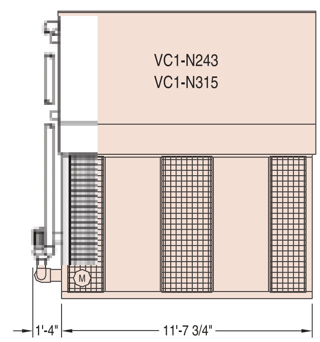

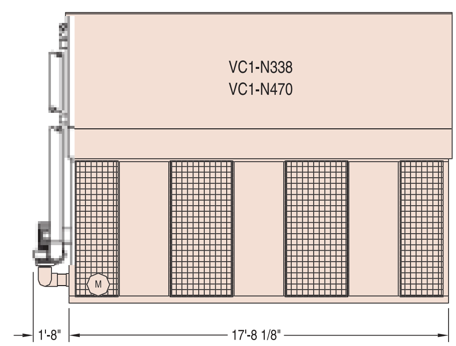

Model Number	R-717 Tons	Approx. Shpg. Weight (lbs)	Approx. Oper. Weight (lbs)	Heaviest Section (Coil) (lbs)	CFM	Motor HP (0" ESP)	GPM	Pump Motor HP	R-717 Oper. Charge (lbs)	Internal Coil Volume (ft³)	REMOTE SUMP Drain Size	REMOTE SUMP Approx. Oper. Weight	REMOTE SUMP Gal. Req.	F	H
VC1-N208	148	10,170	13,710	6,580	39,650	15	305	2	230	25	6	11460	360	33 1/4	135 7/8
VC1-N230	163	11,410	15,000	8,220	38,550	15	305	2	245	31	6	12750	360	42 1/2	145 1/8
VC1-N243	172	10,720	15,140	7,050	46,150	20	385	3	290	36	6	13040	360	33 1/4	153 1/8
VC1-N257	182	10,770	15,190	7,050	49,700	25	385	3	290	36	6	13090	360	33 1/4	153 1/8
VC1-N275	195	12,130	16,700	8,460	44,800	20	385	3	360	44	6	14600	360	42 1/2	162 3/8
VC1-N301	213	13,580	18,210	9,860	47,150	25	385	3	430	53	6	16110	360	51 3/4	171 5/8
VC1-N315	223	13,600	18,230	9,860	50,100	30	385	3	430	53	6	16130	360	51 3/4	171 5/8
VC1-N338	240	15,630	22,360	10,390	60,450	20	580	5	435	53	8	19110	520	33 1/4	153 1/8
VC1-N357	253	15,680	22,410	10,390	65,100	25	580	5	435	53	8	19160	520	33 1/4	153 1/8
VC1-N373	265	15,700	22,430	10,390	69,200	30	580	5	435	53	8	19180	520	33 1/4	153 1/8
VC1-N417	296	17,880	24,820	12,570	67,200	30	580	5	540	66	8	21570	520	42 1/2	162 3/8
VC1-N470	333	20,250	27,410	14,750	72,250	40	580	5	645	79	8	24160	520	51 3/4	171 5/8

NOTES:

1. Model number denotes nominal tons using R-22 at 105°F cond. temp., 40°F suct. temp., 78°F wet bulb. R-717 tons are at 96.3°F cond. temp., 20°F suct. temp., and 78°F wet bulb.
2. The standard right-hand arrangement as shown has the air inlet side on the right when facing the connection end. Left-hand arrangement can be furnished by special order. Water and refrigerant connections are always located on the same end of the unit.
3. Standard refrigerant connection sizes are 3-inch BFW inlet and outlet for VC1-10 through VC1-25, and 4-inch BFW inlet and outlet for all other VC1 and VC2 models. Other connections sizes are available on special order.
4. For indoor application of VC1 models, the room may be used as a plenum with ductwork attached to the discharge only. If inlet ductwork is required, an enclosed fan section must be specified; contact your B.A.C. Representative for details.
5. Fan motor sizes shown in the table are for 0 inches water gauge external static pressure (ESP). For additional ESP up to 1/2 inch, use next larger motor size.
6. Operating weight shown in the table is based on total unit weight, weight of refrigerant operating charge, and basin filled to overflow level.
7. Gallons required is water in suspension in unit plus water in pan at remote sump operating level. Allow for additional water in remote sump to cover pump suction and all related piping.
8. Refrigerant charge listed is R-717 operating charge. To determine operating charge for R-22, multiply charge by 1.93. For R-134a, multiply by 1.98. Contact the factory for other refrigerants.

Engineering Data

VC1 Centrifugal Fan

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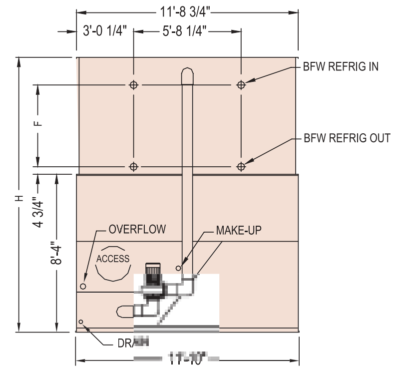

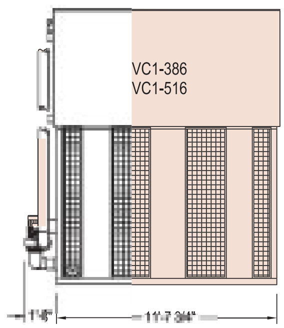

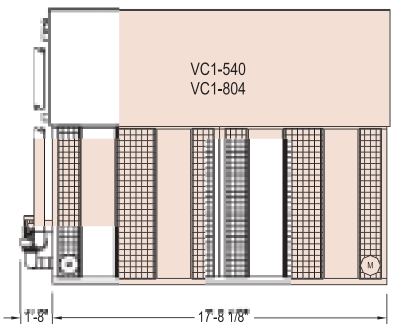

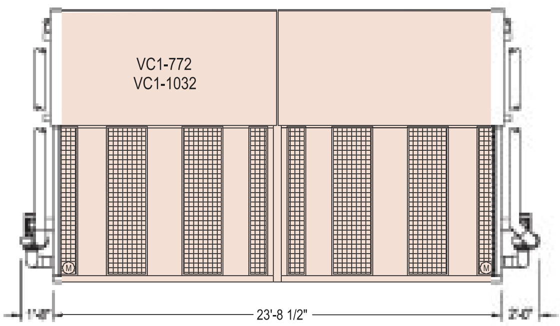

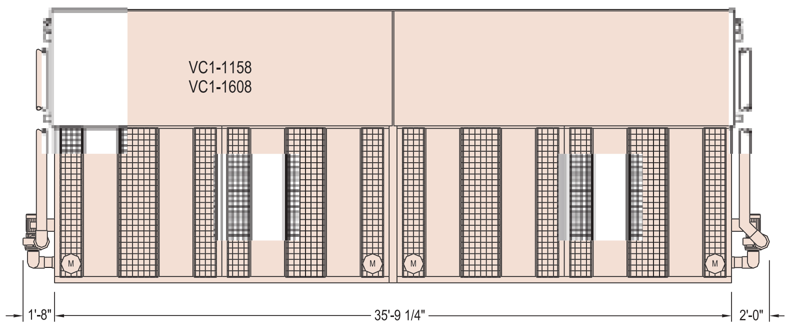

Model Number	R-717 Tons	Approx. Shpg. Weight (lbs)	Approx. Oper. Weight (lbs)	Heaviest Section (Coil) (lbs)	CFM	Motor HP (0" ESP)	GPM	Pump Motor HP	R-717 Oper. Charge (lbs)	Internal Coil Volume (ft^3)	REMOTE SUMP			F	H
											Drain Size	Approx. Oper. Weight	Gal. Req.		
VC1-386	274	15,810	23,860	10,300	74,250	30	585	5	445	55	8	19,350	600	33 1/4	155 1/2
VC1-436	309	17,880	26,140	12,370	72,050	30	585	5	550	68	8	21,630	600	42 1/2	164 3/4
VC1-467	331	18,070	26,330	12,370	79,300	40	585	5	550	68	8	21,820	600	42 1/2	164 3/4
VC1-454	322	19,950	28,430	14,440	70,400	30	585	5	655	81	8	23,920	600	51 3/4	174
VC1-487	345	20,140	28,620	14,440	77,500	40	585	5	655	81	8	24,110	600	51 3/4	174
VC1-516	366	20,180	28,660	14,440	83,450	50	585	5	655	81	8	24,150	600	51 3/4	174
VC1-540	383	22,850	35,090	15,170	97,250	(2) 15	835	5	665	82	10	28,530	710	33 1/4	155 1/2
VC1-579	411	22,870	35,110	15,170	107,050	(2) 20	835	5	665	82	10	28,550	710	33 1/4	155 1/2
VC1-612	434	22,970	35,210	15,170	115,300	(2) 25	835	5	665	82	10	28,650	710	33 1/4	155 1/2
VC1-646	458	25,990	38,560	18,290	103,900	(2) 20	835	5	825	101	10	32,000	710	42 1/2	164 3/4
VC1-683	484	26,090	38,660	18,290	111,950	(2) 25	835	5	825	101	10	32,100	710	42 1/2	164 3/4
VC1-715	507	26,130	38,700	18,290	118,950	(2) 30	835	5	825	101	10	32,140	710	42 1/2	164 3/4
VC1-748	530	29,240	42,140	21,400	116,200	(2) 30	835	5	990	121	10	35,580	710	51 3/4	174
VC1-804	570	29,620	42,520	21,400	127,900	(2) 40	835	5	990	121	10	35,960	710	51 3/4	174
VC1-772	548	31,560	47,930	† 10,960	148,500	(2) 30	1,170	(2) 5	890	109	10	39,760	1,360	33 1/4	155 1/2
VC1-872	618	35,700	52,490	12,370	144,100	(2) 30	1,170	(2) 5	1,100	135	10	44,320	1,360	42 1/2	164 3/4
VC1-934	662	36,080	52,870	12,370	158,600	(2) 40	1,170	(2) 5	1,100	135	10	44,700	1,360	42 1/2	164 3/4
VC1-908	644	39,840	57,070	14,440	140,800	(2) 30	1,170	(2) 5	1,310	162	10	48,900	1,360	51 3/4	174
VC1-974	691	40,220	57,450	14,440	155,000	(2) 40	1,170	(2) 5	1,310	162	10	49,280	1,360	51 3/4	174
VC1-1032	732	40,300	57,530	14,440	166,900	(2) 50	1,170	(2) 5	1,310	162	10	49,360	1,360	51 3/4	174
VC1-1158	821	45,710	70,450	† 15,340	214,100	(4) 20	1,670	(2) 5	1,330	163	12	57,180	2,090	33 1/4	155 1/2
VC1-1224	868	45,910	70,650	† 15,540	230,600	(4) 25	1,670	(2) 5	1,330	163	12	57,380	2,090	33 1/4	155 1/2
VC1-1366	969	52,120	77,520	18,290	223,900	(4) 25	1,670	(2) 5	1,650	203	12	64,250	2,090	42 1/2	164 3/4
VC1-1430	1,014	52,200	77,600	18,290	237,900	(4) 30	1,670	(2) 5	1,650	203	12	64,330	2,090	42 1/2	164 3/4
VC1-1496	1,061	58,420	84,480	21,400	232,400	(4) 30	1,670	(2) 5	1,980	243	12	71,210	2,090	51 3/4	174
VC1-1608	1,140	59,180	85,240	21,400	255,800	(4) 40	1,670	(2) 5	1,980	243	12	71,970	2,090	51 3/4	174

† PAN SECTION IS HEAVIEST SECTION

See next page for notes.

VC1 Centrifugal Fan

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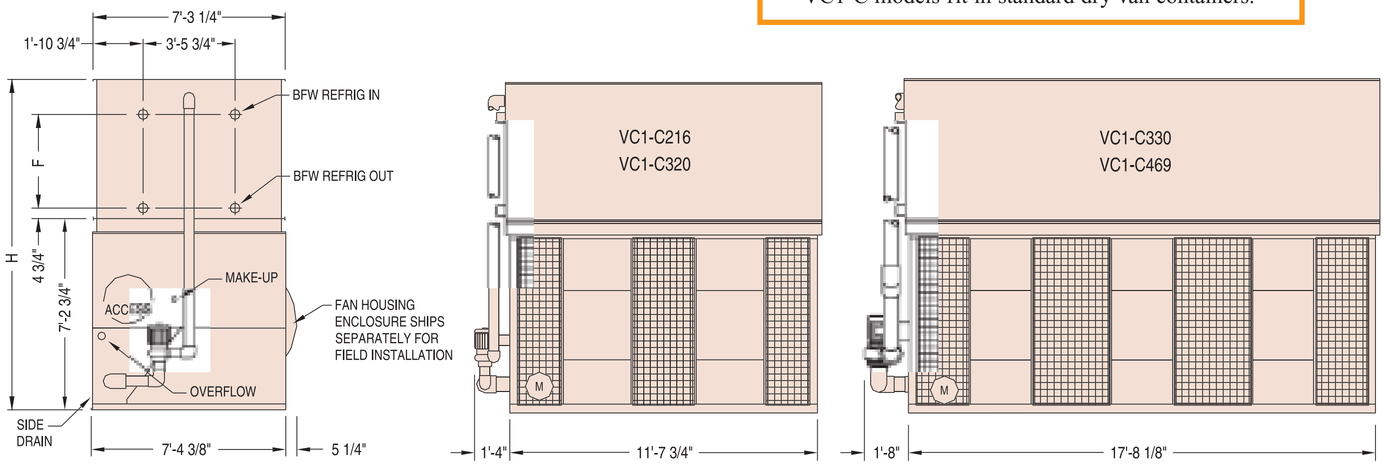
Designed to minimize ocean freight costs,
VC1-C models fit in standard dry van containers.



Model Number	R-717 Tons	Approx. Shpg. Weight (lbs)	Approx. Oper. Weight (lbs)	Heaviest Section (Coil) (lbs)	CFM	Motor HP (0" ESP)	GPM	Pump Motor HP	R-717 Oper. Charge (lbs)	Internal Coil Volume (ft³)	REMOTE SUMP Drain Size	REMOTE SUMP Approx. Oper. Weight	REMOTE SUMP Gal. Req.	F	H
VC1-C216	153	10,270	14,880	6,680	40,060	15	385	3	265	33	6	12,780	360	33 1/4	142 1/4
VC1-C231	164	10,280	14,890	6,680	44,090	20	385	3	265	33	6	12,790	360	33 1/4	142 1/4
VC1-C242	172	11,560	16,300	7,970	38,870	15	385	3	330	40	6	14,200	360	42 1/2	151 1/2
VC1-C260	184	11,570	16,310	7,970	42,790	20	385	3	330	40	6	14,210	360	42 1/2	151 1/2
VC1-C274	194	11,620	16,360	7,970	46,090	25	385	3	330	40	6	14,260	360	42 1/2	151 1/2
VC1-C286	203	11,640	16,380	7,970	48,980	30	385	3	330	40	6	14,280	360	42 1/2	151 1/2
VC1-C299	212	12,920	17,720	9,250	47,830	30	385	3	390	48	6	15,620	360	51 3/4	160 3/4
VC1-C320	227	13,110	17,910	9,250	52,650	40	385	3	390	48	6	15,810	360	51 3/4	160 3/4
VC1-C339	241	15,050	22040	9,830	62,180	25	580	5	395	48	8	18,790	520	33 1/4	142 1/4
VC1-C354	251	15,070	22,060	9,830	66,080	30	580	5	395	48	8	18,810	520	33 1/4	142 1/4
VC1-C380	269	15,260	22,250	9,830	72,730	40	580	5	395	48	8	19,000	520	33 1/4	142 1/4
VC1-C396	281	17,050	24,240	11,810	64,180	30	580	5	490	60	8	20,990	520	42 1/2	151 1/2
VC1-C424	301	17,240	24,430	11,810	70,640	40	580	5	490	60	8	21,180	520	42 1/2	151 1/2
VC1-C445	316	19,240	26,630	13,810	69,020	40	580	5	590	72	8	23,380	520	51 3/4	160 3/4
VC1-C469	333	19,280	26,670	13,810	74,340	50	580	5	590	72	8	23,420	520	51 3/4	160 3/4

NOTES:

1. Model number denotes nominal tons using R-22 at 105°F cond. temp., 40°F suct. temp., 78°F wet bulb. R-717 tons are at 96.3°F cond. temp., 20°F suct. temp., and 78°F wet bulb.
2. The standard right-hand arrangement as shown has the air inlet side on the right when facing the connection end. Left-hand arrangement can be furnished by special order. Water and refrigerant connections are always located on the same end of the unit.
3. Standard refrigerant connection sizes are 4-inch BFW inlet and outlet for VC1 and VC2 models. Other connection sizes are available on special order.
4. For indoor application of VC1 models, the room may be used as a plenum with ductwork attached to the discharge only. If inlet ductwork is required, an enclosed fan section must be specified; contact your B.A.C. Representative for details.
5. Fan motor sizes shown in the table are for 0 inches water gauge external static pressure (ESP). For additional ESP up to 1/2 inch, use next larger motor size.
6. Operating weight shown in the table is based on total unit weight, weight of refrigerant operating charge, and basin filled to overflow level.
7. Gallons required is water in suspension in unit plus water in pan at remote sump operating level. Allow for additional water in remote sump to cover pump suction and all related piping.
8. Refrigerant charge listed is R-717 operating charge. To determine operating charge for R-22, multiply charge by 1.93. For R-134a, multiply by 1.98. Contact the factory for other refrigerants.

Engineering Data

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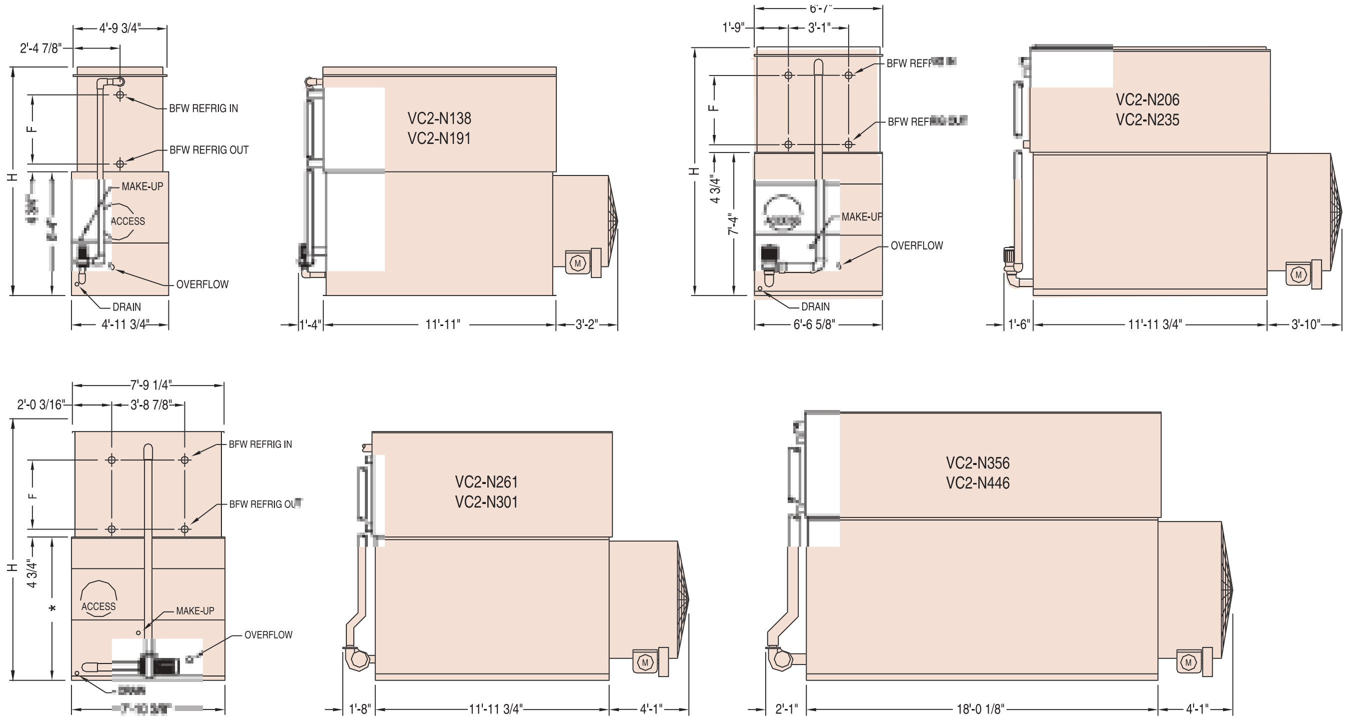
VC2 Axial Fan



* 7' 4" ON MODELS VC2-N206 - N301
8' 4" ON MODELS VC2-N356 - N446

Model Number	R-717 Tons	Approx. Shpg. Weight (lbs)	Approx. Oper. Weight (lbs)	Heaviest Section (Coil) (lbs)	CFM	Motor HP (0" ESP)	GPM	Pump Motor HP	R-717 Oper. Charge (lbs)	Internal Coil Volume (ft³)	REMOTE SUMP Drain Size	REMOTE SUMP Approx. Oper. Weight	REMOTE SUMP Gal. Req.	F	H
VC2-N138	98	7,130	8,920	4,920	25,900	5	220	1 1/2	170	18	6	7,610	270	33 1/4	131 1/8
VC2-N150	106	7,220	9,010	5,830	28,300	7 1/2	220	1 1/2	190	18	6	7,700	270	33 1/4	131 1/8
VC2-N170	121	8,120	9,930	5,930	28,000	7 1/2	220	1 1/2	210	22	6	8,620	270	42 1/2	140 3/8
VC2-N191	135	8,770	10,580	6,580	30,100	10	220	1 1/2	245	26	6	9,270	270	51 3/4	149 5/8
VC2-N206	146	9,960	14,950	6,580	39,650	10	305	2	230	25	6	12,690	430	33 1/4	143 1/8
VC2-N215	152	11,190	16,180	7,810	35,050	7 1/2	305	2	290	31	6	13,920	430	42 1/2	152 3/4
VC2-N235	167	11,210	16,200	7,810	38,750	10	305	2	290	31	6	13,940	430	42 1/2	152 3/4
VC2-N261	185	11,860	15,380	8,460	43,400	10	385	3	360	44	8	13,420	480	42 1/2	152 3/4
VC2-N301	213	13,310	16,970	9,860	48,550	15	385	3	430	53	8	15,010	480	51 3/4	162
VC2-N356	252	15,170	20,260	10,390	67,650	15	580	5	435	53	10	17,250	820	33 1/4	155 1/2
VC2-N396	281	17,350	22,650	12,570	65,700	15	580	5	540	66	10	19,640	820	42 1/2	164 3/4
VC2-N416	295	19,530	25,050	14,750	64,200	15	580	5	645	79	10	22,040	820	51 3/4	174
VC2-N446	316	19,540	25,060	14,750	70,650	20	580	5	645	79	10	22,050	820	51 3/4	174

NOTES:

1. Model number denotes nominal tons using R-22 at 105°F cond. temp., 40°F suct. temp., 78°F wet bulb. R-717 tons are at 96.3°F cond. temp., 20°F suct. temp., and 78°F wet bulb.
2. The standard right-hand arrangement as shown has the air inlet side on the right when facing the connection end. Left-hand arrangement can be furnished by special order. Water and refrigerant connections are always located on the same end of the unit.
3. Standard refrigerant connection sizes are 4-inch BFW inlet and outlet for VC2 models. Other connections sizes are available on special order.
4. Fan motor sizes shown in the table are for 0 inches water gauge external static pressure (ESP).
5. Operating weight shown in the table is based on total unit weight, weight of refrigerant operating charge, and basin filled to overflow level.
6. Gallons required is water in suspension in unit plus water in pan at remote sump operating level. Allow for additional water in remote sump to cover pump suction and all related piping.
7. Refrigerant charge listed is R-717 operating charge. To determine operating charge for R-22, multiply charge by 1.93. For R-134a, multiply by 1.98. Contact the factory for other refrigerants.

VC2 Axial Fan

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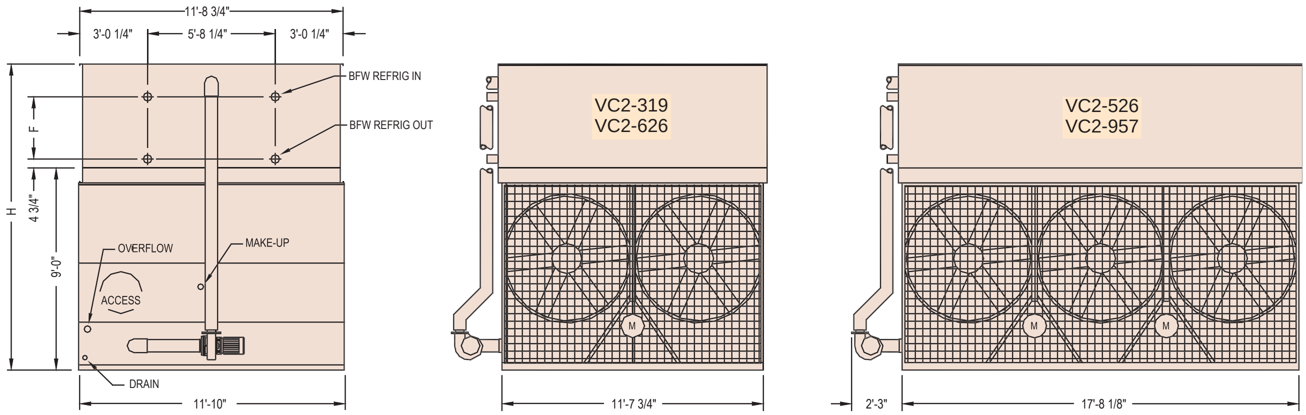


Model Number	R-717 Tons	Approx. Shpg. Weight (lbs)	Approx Oper. Weight (lbs)	Heaviest Section (Coil) (lbs)	CFM	Motor HP (0" ESP)	GPM	Pump Motor HP	R-717 Oper. Charge (lbs)	Internal Coil Volume (ft^3)	REMOTE SUMP Drain Size	REMOTE SUMP Approx. Oper. Weight	REMOTE SUMP Gal Req.	F	H
VC2-319	226	15,240	24,590	10,300	54,300	7.5	585	5	445	55	8	19,550	480	33 1/4	163 1/2
VC2-342	243	15,290	24,640	10,300	59,750	10	585	5	445	55	8	19,600	480	33 1/4	163 1/2
VC2-377	267	15,340	24,690	10,300	68,400	15	585	5	445	55	8	19,650	480	33 1/4	163 1/2
VC2-420	298	17,410	26,970	12,370	68,400	15	585	5	550	68	8	21,930	480	42 1/2	172 3/4
VC2-451	320	17,420	26,980	12,370	73,100	20	585	5	550	68	8	21,940	480	42 1/2	172 3/4
VC2-471	334	19,450	29,010	14,400	71,400	20	585	5	675	81	8	23,970	480	51 3/4	182
VC2-491	348	19,470	29,030	14,400	76,950	25	585	5	675	81	8	23,990	480	51 3/4	182
VC2-513	364	19,490	29,050	14,400	81,750	30	585	5	675	81	8	24,010	480	51 3/4	182
VC2-541	384	20,870	30,510	15,780	81,500	30	585	5	750	91	8	25,470	480	51 3/4	182
VC2-580	411	21,060	30,700	15,780	89,700	40	585	5	750	91	8	25,660	480	51 3/4	182
VC2-585	415	22,740	33,445	18,205	77,040	30	585	5	875	106	8	28,405	480	61	194 1/4
VC2-626	444	22,795	33,500	18,205	85,200	40	585	5	875	106	8	28,460	480	61	194 1/4
VC2-526	373	22,220	36,430	15,170	89,700	10 & 5	835	5	665	82	10	29,050	670	33 1/4	163 1/2
VC2-581	412	22,330	36,540	15,170	102,650	15 & 7.5	835	5	665	82	10	29,160	670	33 1/4	163 1/2
VC2-623	442	22,350	36,560	15,170	113,000	20 & 10	835	5	665	82	10	29,180	670	33 1/4	163 1/2
VC2-642	455	25,450	39,990	18,290	99,600	15 & 7.5	835	5	825	101	10	32,610	670	42 1/2	172 3/4
VC2-688	488	25,470	40,010	18,290	109,650	20 & 10	835	5	825	101	10	32,630	670	42 1/2	172 3/4
VC2-711	504	28,580	43,450	21,400	107,150	20 & 10	835	5	990	121	10	36,070	670	51 3/4	182
VC2-752	533	28,680	43,550	21,400	115,400	25 & 15	835	5	990	121	10	36,170	670	51 3/4	182
VC2-785	557	28,700	43,570	21,400	122,650	30 & 15	835	5	990	121	10	36,190	670	51 3/4	182
VC2-827	587	30,780	45,760	23,480	122,200	30 & 15	835	5	1,100	135	10	38,380	670	51 3/4	182
VC2-887	629	30,980	45,960	23,480	134,500	40 & 20	835	5	1,100	135	10	38,580	670	51 3/4	182
VC2-895	635	33,655	49,895	27,160	115,000	30 & 15	900	7.5	1,290	158	10	42,515	670	61	194 1/4
VC2-957	679	33,765	50,005	27,160	126,080	40 & 20	900	7.5	1,290	158	10	42,625	670	61	194 1/4

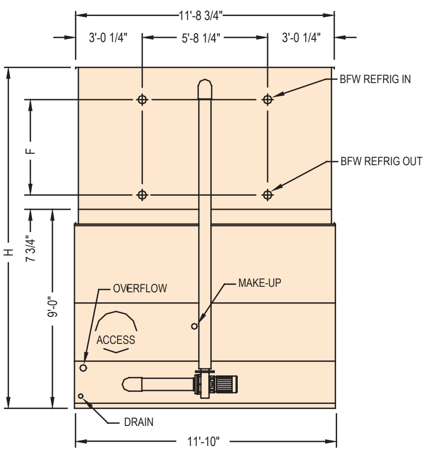
See previous page for notes.

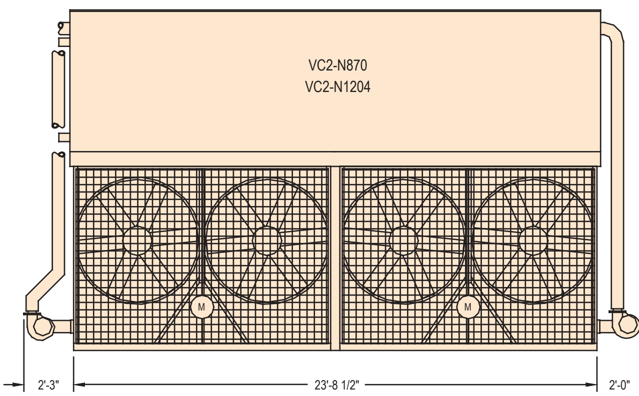
Engineering Data

VC2 Axial Fan

Do not use for construction. Refer to factory certified dimensions.
This brochure includes data current at time of publication, which should be reconfirmed at the time of purchase.

Designed to minimize refrigerent piping, these models have coil connections on just one end.





Model Number	R-717 Tons	Approx. Shpg. Weight (lbs)	Approx. Oper. Weight (lbs)	Heaviest Section (Coil) (lbs)	CFM	Motor HP (0" ESP)	GPM	Pump Motor HP	R-717 Oper. Charge (lbs)	Internal Coil Volume (ft³)	REMOTE SUMP Drain Size	REMOTE SUMP Approx. Oper. Weight	REMOTE SUMP Gal. Req.	F	H
VC2-N870	617	32,325	53,195	23,855	132,800	(2) 15	1,170	(2) 5	1,100	68	10	42,935	1,440	42 1/2	175 3/4
VC2-N932	661	32,415	53,285	23,885	146,200	(2) 20	1,170	(2) 5	1,100	68	10	43,025	1,440	42 1/2	175 3/4
VC2-N1000	709	32,725	53,595	23,885	163,100	(2) 25	1,170	(2) 5	1,100	68	10	43,335	1,440	51 3/4	185
VC2-N1071	760	38,595	58,445	27,795	163,500	(2) 30	1,170	(2) 5	1,350	80	10	48,185	1,440	51 3/4	185
VC2-N1124	797	39,610	61,480	30,510	160,230	(2) 30	1,170	(2) 5	1,510	90	10	51,700	1,440	51 3/4	185
VC2-N1204	854	39,740	61,610	30,510	176,340	(2) 40	1,170	(2) 5	1,510	90	10	52,080	1,440	51 3/4	185

NOTES:

1. Model number denotes nominal tons using R-22 at 105°F cond. temp., 40°F suct. temp., 78°F wet bulb. R-717 tons are at 96.3°F cond. temp., 20°F suct. temp., and 78°F wet bulb.
2. The standard right-hand arrangement as shown has the air inlet side on the right when facing the connection end. Left-hand arrangement can be furnished by special order. Water and refrigerant connections are always located on the same end of the unit.
3. Standard refrigerant connection sizes are 4-inch BFW inlet and outlet for VC2 models. Other connections sizes are available on special order. For R-22 and R-134a, the coil connection quantity will double on models VC2-N870 to N1204.
4. The vertical liquid leg heights for models VC2-N870 to -N1204 should be at least seven feet for multiple ammonia condenser installations. Minimum liquid leg height and number of coil connections are subject to overall system piping requirements.
5. Operating weight shown in the table is based on total unit weight, weight of refrigerant operating charge, and basin filled to overflow level.
6. Gallons required is water in suspension in unit plus water in pan at remote sump operating level. Allow for additional water in remote sump to cover pump suction and all related piping.
7. Refrigerant charge listed is R-717 operating charge. To determine operating charge for R-22, multiply charge by 1.93. For R-134a, multiply by 1.98. Contact the factory for other refrigerants.

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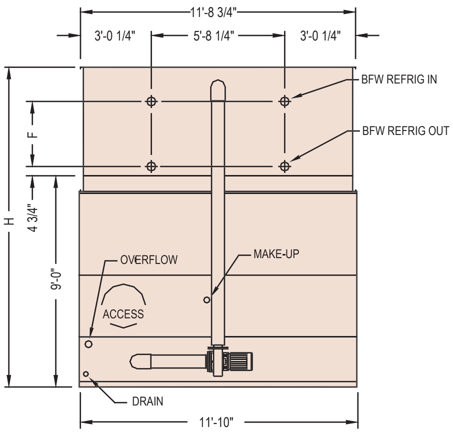
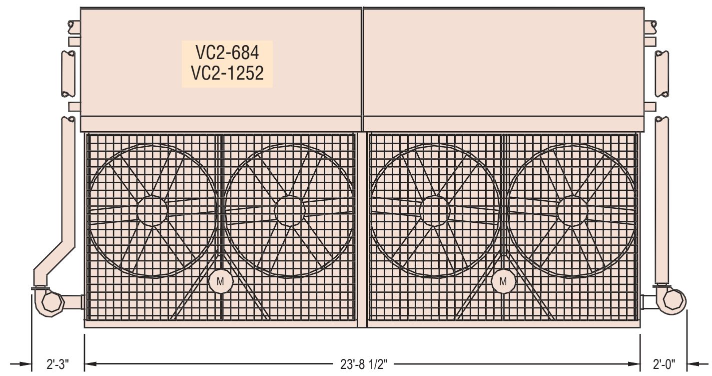
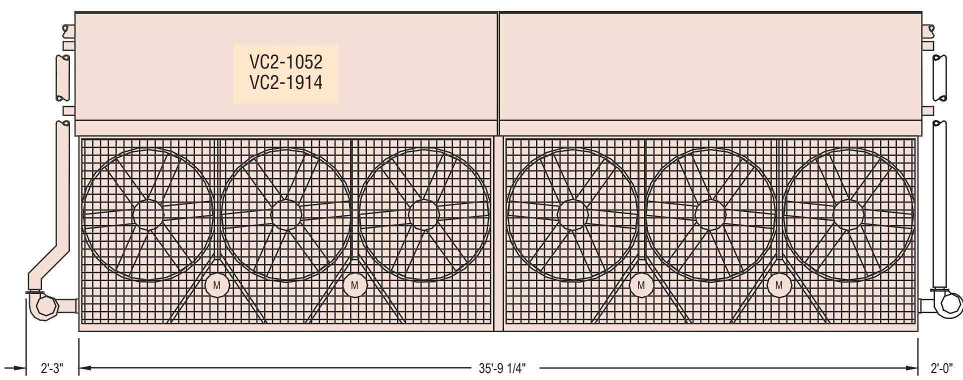
VC2 Axial Fan







Model Number	R-717 Tons	Approx. Shpg. Weight (lbs)	Approx. Oper. Weight (lbs)	Heaviest Section (Coil) (lbs)	CFM	Motor HP (0" ESP)	GPM	Pump Motor HP	R-717 Oper. Charge (lbs)	Internal Coil Volume (ft^3)	REMOTE SUMP Drain Size	REMOTE SUMP Approx. Oper. Weight	REMOTE SUMP Gal. Req.	F	H
VC2-684	485	30,570	49,580	10,300	119,500	(2) 10	1,170	(2) 5	890	109	10	39,320	1,440	33 1/4	163 1/2
VC2-754	535	30,670	49,680	10,300	136,800	(2) 15	1,170	(2) 5	890	109	10	39,420	1,440	33 1/4	163 1/2
VC2-840	596	34,810	54,240	12,370	132,800	(2) 15	1,170	(2) 5	1,100	135	10	43,980	1,440	42 1/2	172 3/4
VC2-902	640	34,830	54,260	12,370	146,200	(2) 20	1,170	(2) 5	1,100	135	10	44,000	1,440	42 1/2	172 3/4
VC2-942	668	38,900	58,020	14,400	142,800	(2) 20	1,170	(2) 5	1,350	162	10	47,760	1,440	51 /34	182
VC2-982	696	38,940	58,060	14,400	153,900	(2) 25	1,170	(2) 5	1,350	162	10	47,780	1,440	51 3/4	182
VC2-1026	728	38,980	58,100	14,400	163,500	(2) 30	1,170	(2) 5	1,350	162	10	47,820	1,440	51 3/4	182
VC2-1082	767	41,740	61,020	15,780	160,230	(2) 30	1,170	(2) 5	1,510	181	10	50,740	1,440	51 3/4	182
VC2-1160	823	42,120	61,400	15,780	176,340	(2) 40	1,170	(2) 5	1,510	181	10	51,120	1,440	51 3/4	182
VC2-1170	830	45,905	67,645	15,780	154,080	(2) 30	1,170	(2) 5	1,715	212	10	57,385	1,440	61	194 1/4
VC2-1252	888	46,015	67,755	15,780	170,400	(2) 40	1,170	(2) 5	1,715	212	10	57,495	1,440	61	194 1/4
VC2-1052	746	44,420	73,170	15,170	179,400	(2) 10 & (2) 5	1,670	(2) 5	1,330	163	12	58,240	2,220	33 1/4	163 1/2
VC2-1162	824	44,640	73,390	15,170	205,300	(2) 15 & (2) 7 1/2	1,670	(2) 5	1,330	163	12	58,460	2,220	33 1/4	163 1/2
VC2-1246	884	44,680	73,430	15,170	226,000	(2) 20 & (2) 10	1,670	(2) 5	1,330	163	12	58,500	2,220	33 1/4	163 1/2
VC2-1284	911	50,880	80,290	18,290	199,200	(2) 15 & (2) 7 1/2	1,670	(2) 5	1,650	203	12	65,360	2,220	42 1/2	172 3/4
VC2-1376	976	50,920	80,330	18,290	219,300	(2) 20 & (2) 10	1,670	(2) 5	1,650	203	12	65,400	2,220	42 1/2	172 3/4
VC2-1422	1,009	57,140	87,210	21,400	214,300	(2) 20 & (2) 10	1,670	(2) 5	1,980	243	12	72,280	2,220	51 3/4	182
VC2-1504	1,067	57,340	87,410	21,400	230,800	(2) 25 & (2) 15	1,670	(2) 5	1,980	243	12	72,480	2,220	51 3/4	182
VC2-1570	1,113	57,380	87,450	21,400	245,300	(2) 30 & (2) 15	1,670	(2) 5	1,980	243	12	72,520	2,220	51 3/4	182
VC2-1654	1,173	61,540	91,840	23,480	240,400	(2) 30 & (2) 15	1,670	(2) 5	2,210	271	12	76,910	2,220	51 3/4	182
VC2-1774	1,258	61,940	92,240	23,480	264,600	(2) 40 & (2) 20	1,670	(2) 5	2,210	271	12	77,310	2,220	51 3/4	182
VC2-1790	1,269	67,000	99,790	27,160	230,000	(2) 30 & (2) 15	1,800	(2) 7.5	2,580	316	12	84,860	2,220	61	194 1/4
VC2-1914	1,357	67,220	100,010	27,160	252,160	(2) 40 & (2) 20	1,800	(2) 7.5	2,580	316	12	85,080	2,220	61	194 1/4

See notes previous page.

Engineering Data

VCL Low Profile

Do not use for construction. Refer to factory certified dimensions.
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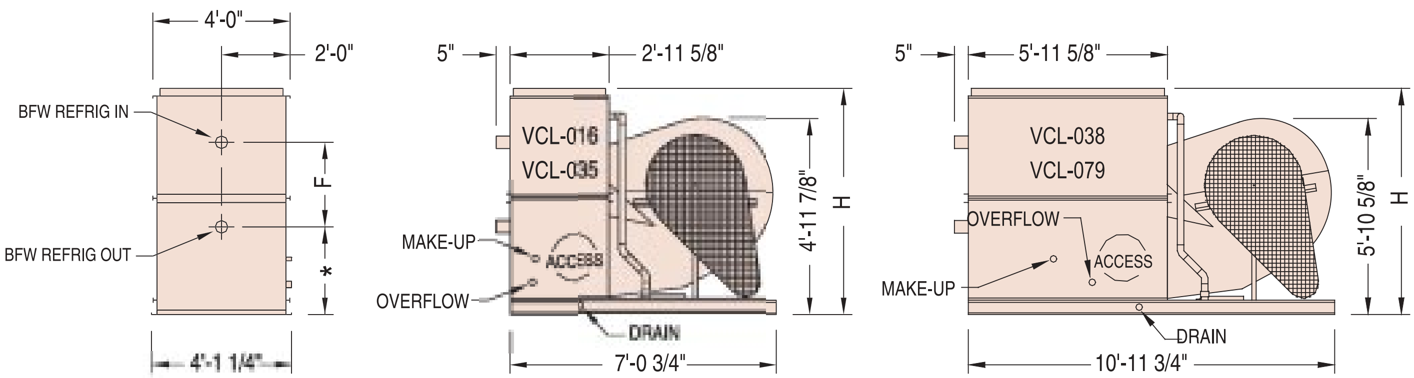
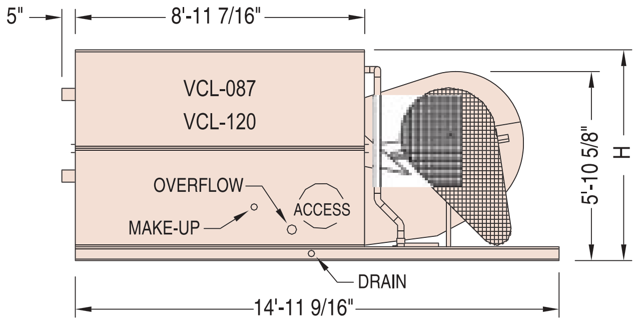
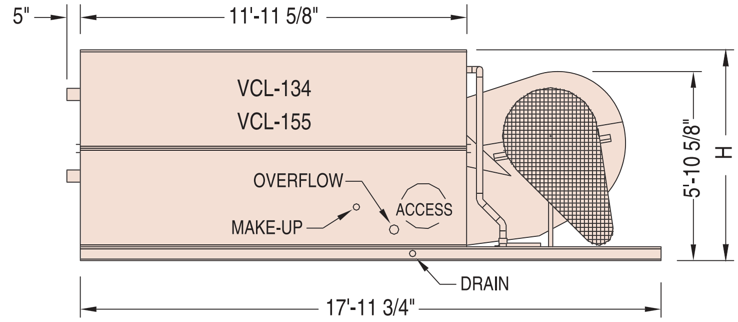


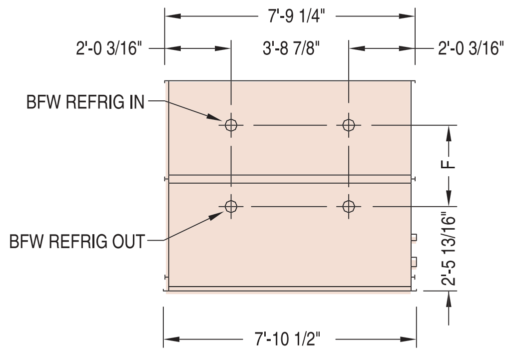
* 2'-5 5/16" ON VCL-016 - 035
* 2'-5 13/16" ON ALL OTHER MODELS

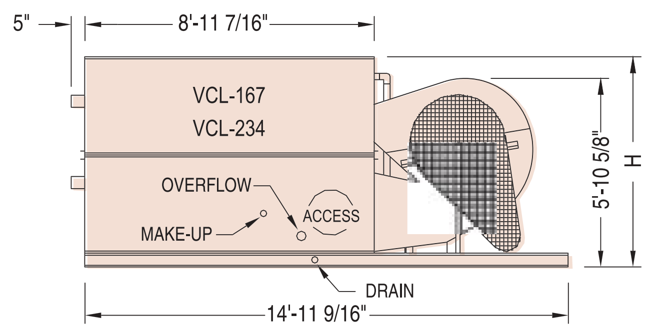
Model No.	R-717 Tons	Approx. Shpg. Weight (lbs)	Approx. Oper. Weight (lbs)	CFM	Motor HP (0" ESP)	GPM	Pump Motor HP	R-717 Oper. Charge (lbs)	Internal Coil Volume (ft³)	REMOTE SUMP Approx. Drain Size	REMOTE SUMP Oper. Weight	REMOTE SUMP Gal. Req.	F	H
VCL-016	11	1,660	2,210	7,040	1	45	1/3	23	2.6	3	1,860	40	14 1/4	62 1/4
VCL-019	13	1,690	2,240	8,310	2	45	1/3	23	2.6	3	1890	40	14 1/4	65
VCL-024	17	1,900	2,470	8,010	2	45	1/3	34	3.6	3	2,120	40	22 3/4	75 3/4
VCL-029	21	2,120	2,700	7,660	2	45	1/3	44	4.7	3	2,350	40	31 1/4	82
VCL-035	25	2,360	2,960	8,140	3	45	1/3	52	5.7	3	2,610	40	39 3/4	90 1/2
VCL-038	27	2,400	3,530	12,800	3	94	1/2	44	4.8	4	2,980	95	13 1/4	62 1/4
VCL-044	31	2,760	3,940	12,620	2	94	1/2	62	6.9	4	3,390	95	21 3/4	73
VCL-048	34	2,790	3,970	14,250	3	94	1/2	62	6.9	4	3,420	95	42 1/2	73
VCL-054	38	2,810	3,990	16,150	5	94	1/2	62	6.9	4	3,440	95	21 3/4	75 3/4
VCL-058	41	3,180	4370	13,570	3	94	1/2	83	9.0	4	3,820	95	30 1/4	79 1/4
VCL-065	46	3,200	4,390	15,600	5	94	1/2	83	9.0	4	3,840	95	30 1/4	79 1/4
VCL-073	52	3,610	4,820	15,150	5	94	1/2	101	11	4	4,270	95	38 3/4	87 3/4
VCL-079	56	3,680	4,890	16,690	7 1/2	94	1/2	101	11	4	4,340	95	38 3/4	90 1/2
VCL-087	62	4,380	6,130	19,280	5	142	1	122	13	4	5,840	200	33 1/4	82 1/4
VCL-096	68	4,410	6,160	21,570	7 1/2	142	1	122	13	4	5,870	200	33 1/4	82 1/4
VCL-102	72	4,440	6,190	23,730	10	142	1	122	13	4	5,900	200	33 1/4	82 1/4
VCL-108	77	4,990	6,770	21,200	7 1/2	142	1	159	17	4	6,480	200	42 1/2	92 9/16
VCL-115	82	5,020	6,800	22,970	10	142	1	159	17	4	6,510	200	42 1/2	92 9/16
VCL-120	85	5,620	7,440	22,210	10	142	1	182	20	4	7,150	200	51 3/4	100 3/4
VCL-134	95	6,160	8,590	25,130	10	192	1 1/2	203	22	6	7,990	250	42 1/2	92 9/16
VCL-148	105	6,220	8,650	28,400	15	192	1 1/2	203	22	6	8,050	250	42 1/2	92 9/16
VCL-155	110	6,950	9,450	28,000	15	192	1 1/2	242	26	6	8,850	250	51 3/4	100 3/4
VCL-167	118	8,030	11570	36,870	10	284	1 1/2	244	27	6	10,850	385	33 1/4	82 1/4
VCL-185	131	8,090	11,630	41,560	15	284	1 1/2	244	27	6	10,910	385	33 1/4	82 1/4
VCL-209	148	9,270	12,870	40,780	15	284	1 1/2	317	34	6	12,150	385	42 1/2	92 9/16
VCL-223	158	9,280	12,880	44,290	20	284	1 1/2	317	34	6	12,160	385	42 1/2	92 9/16
VCL-234	166	10,460	14,140	43,480	20	284	1 1/2	364	39	6	13,420	385	51 3/4	100 3/4
VCL-257	182	11,080	16,000	47,860	20	384	2	406	44	8	14,260	405	42 1/2	92 9/16
VCL-271	192	12,480	17,540	47,370	20	384	2	484	53	8	15,800	405	51 3/4	100 3/4
VCL-286	203	12,520	17,580	50,670	25	384	2	484	53	8	15,840	405	51 3/4	100 3/4
VCL-299	212	12,560	17,620	53,520	30	384	2	484	53	8	15,880	405	51 3/4	100 3/4

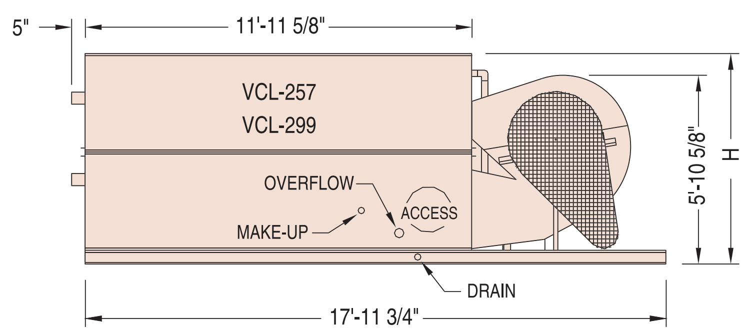
See notes next page.











NOTES:

1. Model number denotes nominal tons using R-22 at 105°F cond. temp., 40°F suct. temp., 78°F wet bulb. R-717 tons are at 96.3°F cond. temp., 20°F suct. temp., and 78°F wet bulb.
2. Standard refrigerant connection sizes are 3-inch BFW inlet and outlet for VCL-016 through VCL-035, and 4-inch BFW inlet and outlet for all other VCL models. Other connections sizes are available on special order.
3. For indoor application of VCL models, the room may be used as a plenum with ductwork attached to the discharge only. If inlet ductwork is required, and enclosed fan section must be specified; contact your B.A.C. Representative for details.
4. All models are single coil section units. Fan cycling results only in on-off operation. For additional steps of control, the energy-miser fan system and two-speed fan motors are available. More precise capacity control can be obtained with modulating fan discharge dampers (see page 20 for details).
5. Fan motor sizes shown in the table are for 0 inches water gauge external static pressure (ESP). For additional ESP up to 1/2 inch, use next larger motor size.
6. Operating weight shown in the table is based on total unit weight, weight of refrigerant operating charge, and basin filled to overflow level.
7. Refrigerant charge listed is R-717 operating charge. To determine operating charge for R-22, multiply charge by 1.93. For R-134a, multiply by 1.98. Contact the factory for other refrigerants.

Optional Accessory Equipment

Independent Fan System

The Independent Fan System provides dedicated motors and drives so each fan can be independently cycled on and off, providing additional capacity control flexibility. Individual fan drives replace the one-motor/two-fan drive systems that are standard on models that have multiple axial fans. All axial fan units with multiple motors have an internal baffle system to deter air bypass within the unit. The Independent Fan System provides additional baffles.

Subcooling Coils

Subcooling coils are available for those halocarbon refrigerant installations where subcooled refrigerant is specified, or where the pressure drop or a vertical rise in the liquid line is great enough to cause excessive flashing. Standard subcooling coil sections provide approximately 10°F of subcooling at standard conditions. Where greater subcooling is specified or required, consult your B.A.C. Representative for selection and pricing.

Subcooling sections are approximately 7" high and are mounted between the coil and pan/fan sections. Coils are hot-dip galvanized after fabrication and tested at 375 psig air pressure under water.

Multiple Circuit Coils

In general, multiple circuit coils are required primarily on halocarbon refrigerant systems where it is common practice to maintain individual compressor systems. Also a circuit can be isolated to provide cooling of a glycol loop for compressor jacket cooling. Series V Evaporative Condensers can be provided with a wide range of multiple circuit arrangements. Consult your B.A.C. Representative for circuiting details.

ASME Coils

This coil is recommended when designers or owners prefer the security of a coil designed to an accepted standard or where state or local codes require an ASME coil. The ASME coil meets the stringent requirements of the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, and bears an ASME "U" stamp.

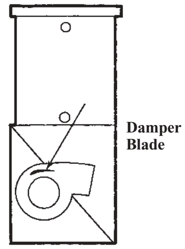
The coil design has been reviewed and approved and materials of construction are traceable to their sources. Full penetration welds are used in accordance with code requirements by ASME certified welders. Both the assembly and final pressure test are witnessed by an ASME authorized inspector.

Extended Surface Coils

The extended surface coils are available for projects where plume abatement, minimum use of water, or dry operation in winter is critical. The extended surface coil is finned to allow the condenser recirculating water pump to be shut off and the unit operated dry during low load and/or low ambient temperature conditions.

The base tubes are continuous serpentine and optimally spaced fins are provided on designated rows. The entire assembly is then hot-dip galvanized for optimum corrosion protection.

Capacity Control Dampers



Modulating capacity control dampers are available for VC1 and VCL centrifugal fan evaporative condensers, and are recommended when close control of head pressure is desired and/or the condenser will be operated under varying loads at below-freezing ambient temperatures. The use of capacity control dampers also affords greater power savings over the operating season that can be obtained by fan cycling alone.

Fan discharge dampers consist of a single airfoil type damper blade located in the discharge of each fan housing. In this location, the dampers are protected from the cascading water in the unit, preventing corrosion of the damper linkage and blade icing at low ambient temperatures.

B.A.C. offers an electrical control package consisting of a control transformer, damper motor actuator with linkages, and end switches to shut off fan motors when the dampers reach the closed position. A proportional acting pressure controller is also furnished for installation in the discharge line from the compressor, or in the receiver. It modulates the dampers to control airflow through the condenser, matching capacity to the load, and minimizing energy consumption.

Desuperheaters

Desuperheaters are available for Series V Evaporative Condensers for those ammonia (R-717) installations with space limitations, where the addition of a desuperheater would permit the use of a unit with a smaller plan area. The desuperheater section is mounted on top of the condenser in the discharge air stream. The finned coil is constructed of B.A.C. standard steel pipe, hot-dip galvanized after fabrication, and tested at 375 psig air pressure under water. Piping between the desuperheater coils and the condenser coils is not included.

Sound Attenuation

Series V Evaporative Condensers will meet most sound level criteria without acoustical treatment. For extremely sound sensitive installations, VC1, and VCL units can be provided with factory assembled sound attenuators for field mounting.

Energy-Miser® Fan System

The ENERGY-MISER® Fan System is a capacity control alternative to two-speed motors on most VC1 and VCL units. Like two-speed motors, they may be used by themselves or in conjunction with capacity control dampers for maximum control of condensing temperature and minimum energy consumption.

The ENERGY-MISER® Fan System consists of two standard 1800 RPM motors and drive assemblies on either end of the fan shaft. The smaller horsepower motor is sized for approximately 1/3 of design horsepower and 2/3 fan speed. Control of the system is similar to control of a two-speed/two-winding motor.

The ENERGY-MISER® Fan System provides many benefits compared to two-speed motor systems. Part load efficiencies are improved, and standby protection is afforded with the use of two single-speed motors. Further, the ENERGY-MISER® Fan System is comprised completely of "off-the-shelf" components for quick replacement should a motor failure occur.

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 pan heaters are available from B.A.C. In addition, the pump suction line, pump, pump discharge line (up to the overflow), and the water make-up line should be wrapped with a heat tracing element and insulated.

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.

Model Number	Standard kW (0°F)	Canadian kW (-20°F)	Model Number	Standard kW (0°F)	Canadian kW (-20°F)
VC1-10-25	2.0	2.0	VC2-N138-191	5.0	9.0
VC1-30-65	2.0	2.0	VC2-N206-235	7.0	10.0
VC1-72-90	2.0	3.0	VC2-N261-301	8.0	10.0
VC1-100-135	3.0	5.0	VC2-N356-446	12.0	16.0
VC1-150-205	3.0	5.0	VC2-342-626	10.0	16.0
VC1-N208-230	5.0	7.5	VC2-526-957	16.0	20.0
VC1-N243-315	5.0	7.5	VC2-N870-1204	(2) 10	(2) 16
VC1-C216-320	5.0	7.5	VC2-684-1252	(2) 10	(2) 16
VC1-N338-470	7.0	10.0	VC2-1052-1914	(2) 16	(2) 20
VC1-C334-469	5.0	7.5			
VC1-386-516	8.0	10.0	VCL-016-035	2.0	2.0
VC1-540-804	12.0	16.0	VCL-038-079	3.0	4.0
VC1-772-1032	(2) 8	(2) 10	VCL-087-120	4.0	5.0
VC1-1158-1608	(2) 12	(2) 16	VCL-134-155	5.0	7.0
			VCL-167-234	7.0	9.0
			VCL-257-299	9.0	12.0

IOBIO® Bacteria, Slime, and Algae Control

The IOBIO® Bacteria, Slime, and Algae Control device controls the growth of bacteria, slime, and algae associated with open recirculating cooling water by automatically dispensing a precise and very low concentration of elemental iodine into the recirculating water. If uncontrolled, these microorganisms can reduce the efficiency of heat transfer equipment.

The IOBIO® Control is installed in the make-up water supply to the evaporative condenser. In operation, some of the make-up water is diverted into the IOBIO® canister where it quickly becomes fully saturated with iodine. A small amount of this saturated iodine solution is automatically metered into the make-up and mixes with the recirculating water in the system. This residual concentration of iodine continuously controls bacteria, slime, and algae in all parts of the system.

Bottom Panels and Screens

Factory-installed bottom panels are available for VC1 and VCL condensers. They are required when the intake air is ducted to the unit.

Air inlet screens can be factory-installed on the bottom of all Series V Condensers when location makes this additional protection desirable or necessary for safety purposes.

Application

Satisfactory evaporative condenser performance is dependent on correct selection and proper attention to overall system design. Some of the major planning considerations are highlighted below, and attention is called to published B.A.C. bulletins and manuals which provide a more detailed treatment of evaporative condenser application, operation, and maintenance.

Refer to pages 8 through 11 of this bulletin for selection procedures. Refer to the "Evaporative Condenser Engineering Manual" for recommendations on such areas of application as location, year-round operating, capacity control, piping and purging. Refer to the "Maintenance Manual" for recommendations on proper maintenance procedures.

Location

Evaporative condensers must be located so as to have an unimpeded supply of air to all condenser fans. When units are located in enclosures or against walls, discharge air from the unit must be carried above the adjoining walls so that the warm saturated discharge air is not deflected back to the air intakes. In the case of inside condenser installations, discharge air to the outside must be directed away from the air inlet to avoid recirculation and loss of capacity. **Warning: Each evaporative condenser should be located and positioned to prevent the introduction of the warm discharge air and the associated drift, which may contain chemical or biological contaminants, including Legionella, into the ventilation systems of the building on which the condenser is located or those of adjacent buildings.**

Year-Round Operation

Most evaporative condenser installations operate year-round so consideration must be given to protection against freezing. A most satisfactory method involves the use of any auxiliary sump tank with a spray water recirculating pump located within a heated space. The condenser pan drains to the indoor sump whenever the recirculating pump is not operating. This permits dry operation of the condenser when the load and ambient temperatures are low, but spray water is immediately available if required. When dry operating is planned for low ambient conditions, the centrifugal fan evaporative condenser should be provided with the next larger size fan motor(s) to prevent motor overload when the spray water is not operating.

The indoor remote sump must be sized to provide an operating suction head for the pump and with a surge volume above this operating level to hold all the water that will drain back when the pump is shut down. This includes water in suspension in the condenser and the water in the condenser pan during normal operation plus that in the pipe lines between the condenser and sump.

Recirculating water pumps for remote sump applications (by others) must be selected for the required flow at a total head which includes the vertical lift, pipe friction (in supply and suction lines) plus 2.0 psi at the inlet header of the condenser distribution system. A valve should always be installed in the discharge line from the pump to permit adjusting flow to the condenser requirement. Inlet water pressure should be measured by a pressure gauge installed in the water supply riser at the condenser inlet, and adjusted to the specified inlet pressure.

Occasionally, because of the condenser location or space limitations, a remote sump application may be impractical. In such cases, electric heaters or pan coils can be installed in the condenser pan to prevent freezing at low ambient temperatures when the spray pump and fans are off. In addition, the pump suction line, pump, pump discharge line (up to the overflow), and the make-up line should be wrapped with a heat-tracing element and insulated.

Capacity Control

Many air-conditioning and refrigeration applications are subject to wide load variations and where refrigerant controls require a reasonably constant condensing pressure, some form of capacity control is necessary.

Modulating dampers in the fan discharge of centrifugal units as described under optional accessories, page 22, are the most desirable and recommended method of capacity control. This is particularly the case for single fan section units where fan cycling produces only "on" or "off" steps of control. Modulating control is also important for halocarbon refrigerant installations where evaporator thermal valves require a reasonably constant pressure differential across the valve. Damper control affords an infinite number of capacity steps and has the added advantage of reduced fan horsepower as the airflow is reduced.

Fan cycling is a convenient method of control. This method of control is subject to wider condensing pressure variations than the use of dampers but is satisfactory for many installations.

Warning: When a VC2 multi-stage axial fan Evaporative Condenser is controlled with a variable fan speed control device, steps must be taken to avoid operating at or near the fan's "critical speed." Consult with your local B.A.C. Representative on any application utilizing variable speed control to determine whether any critical speeds may be encountered.

Water pump cycling should not be used for capacity control. Condenser capacity changes so greatly with and without spray water that this method of control often results in short cycling of the pump. In addition, alternate wetting and drying of the condenser coil promotes scaling of the condensing surface.

Piping

Proper piping is most important to successful and economical evaporative condenser operation. Piping should be adequately sized according to standard refrigeration practice and laid out to allow flexibility for expansion and contraction between component parts of the system. Suitably sized equalizing lines must be installed between the condenser and high pressure receiver to prevent gas binding and refrigerant backup in the condenser. Service valves should be installed so that the component parts may be easily serviced. On multiple evaporative condenser installations, or evaporative condensers in parallel with shell-and-tube condensers, or single condensers with multiple coils, refrigerant outlet connections must be trapped into the main liquid refrigerant header. The height of the trapped liquid legs must be sufficient to balance the effect of unequal coil pressures without backing up liquid refrigerant into the condensing coil. This type of liquid line piping permits independent operation of any one of the paralleled circuits without manually closing inlet and outlet valves.

Water Treatment

As water evaporates in an evaporative condenser, the dissolved solids originally present in the water remain in the system. The concentration of dissolved solids increases rapidly and can cause scale and corrosion. In addition, airborne impurities and biological contaminant's, including Legionella, may be introduced into the recirculating water. To control all potential contaminant's, a water treatment program must be employed. Although general recommendations regarding the quality of water circulated through BAC evaporative condensers are made below, it is always the responsibility of the end-user to contact a competent water treatment specialist to design an application-specific treatment program for a given system. This program should consider (as a minimum) monitoring water quality, adjusting the bleed rate, passivating galvanized steel surfaces, chemically treating for corrosion scale, and biological control.

For optimal heat transfer efficiency and maximum equipment life, the cycles of concentration should be controlled such that the recirculating water is maintained within the guidelines listed in the table below.

Criteria	Galvanized Steel Construction
pH	7.0 to 9.0[1]
Hardness as CaCO3	30 to 500 ppm max.
Alkalinity as CaCO3	500 ppm max.
Total Dissolved Solids	1,000 ppm max.
Chlorides	125 ppm max.
Sulfates	125 ppm max.

[1]Units having galvanized steel construction and a circulating water pH of 8.3 or higher will require periodic passivation of the galvanized steel to prevent "white rust," the accumulation of white, waxy, non-protective zinc corrosion products on galvanized steel surfaces.

The variables in water chemistry are often complex and applications-specific. Even if each of the above requirements is met, it is still possible for the *overall* water quality to be unacceptable. Likewise, acceptable water quality is achievable with certain criteria outside the recommended guidelines. ***The end user should implement an application specific treatment program developed and administrated by a water treatment specialist based on the available water supply.***

The bleed rate and water quality should be periodically checked to ensure that adequate control of the water quality is being maintained. The required continuous bleed rate may be calculated by the formula:

$$\text{Bleed Rate} = \frac{\text{Evaporation Rate}}{(\text{Cycles of Concentration} - 1)}$$

The evaporation rate can be determined by one of the following:

(1) approximately 2 USGPM per one million Btu/hr of heat rejection, or

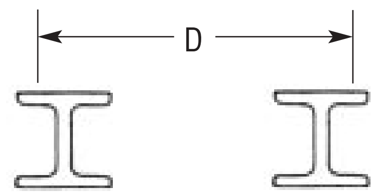
(2) approximately 3 USGPM per 100 tons of refrigeration.

Cycles of concentration equal the number of times impurities in the recirculating water have been increased through evaporation.

Refer to the *BAC Operating and Maintenance Instructions* for more detailed recommendations. For specific recommendations on water treatment for scale, corrosion or biological control, consult a qualified water treatment consultant.

Support

The recommended support arrangement for Series V units consists of 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 the B.A.C. unit certified print for bolt hole location.



Note: Models VC1-386 through VC1-1608 and Models VC2-342 through VC2-1914 (12' wide units) can also be supported with beams on nominal 10' wide centers. In this case, the fan section will overhang the support steel approximately 2 feet. Contact your B.A.C. Representative for exact dimensions.

Beam Size and Length

Beam size should be calculated in accordance with accepted structural practice. Use 65 percent of the operating weight as a uniform load on each beam. The length of the beam must be at least equal to the length of the pan. Refer to Engineering Data section pages 12 to 21 for pan dimensions.

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

Vibration Isolators

If vibration isolators are used, a rail or channel must be provided between the unit and the isolators to provide continuous unit support. Refer to vibration isolator drawings for the length of the rails and mounting hole locations, which may differ from the length and the hole locations of the unit itself.

Steel Support Data

Model Number	D (in)	Max. Deflection (in)	Model Number	D (in)	Max. Deflection (in)
VC1-10-25	45 3/8	3/32	VC2-N138-191	57 1/2	3/8
VC1-30-65	45 3/8	3/16	VC2-N206-235	76 1/4	3/8
VC1-72-90	45 3/8	5/16	VC2-N261-301	92	3/8
VC1-100-135	45 3/8	3/8	VC2-N356-446	92	1/2
VC1-150-205	54 1/4	3/8	VC2-342-626*	139 1/4	3/8
VC1-N208-230	91 5/8	3/8	VC2-526-957*	139 1/4	1/2
VC1-N243-315	91 5/8	3/8	VC2-N870-1204*	139 1/4	1/2
VC1-N338-470	91 5/8	1/2	VC2-684-1252*	139 1/4	1/2
VC1-386-516*	139 1/4	1/2	VC2-1052-1914*	139 1/4	1/2
VC1-540-804*	139 1/4	1/2			
VC1-772-1032*	139 1/4	1/2	VCL-016-035	47	1/8
VC1-1158-1608*	139 1/4	1/2	VCL-038-079	47	1/8
VC1-C216-320	85 5/8	3/8	VCL-087-120	47	1/8
VC1-C339-469	85 5/8	1/2	VCL-134-155	47	1/8
			VCL-167-234	92 1/4	1/4
			VCL-257-299	92 1/4	1/4

*Alternate Centerline Distance (D): 115 1/2"

SAFETY

Adequate precautions, appropriate for the installation and location of these products, should be taken to safeguard the equipment and the premises from damage and the public from possible injury.

Operation, maintenance and repair of this equipment should be undertaken only by personnel qualified to do so. Proper care, procedures and tools must be used in handling, lifting, installing, operating, maintaining and repairing this equipment to prevent personal injury and/or property damage.

For a discussion of Safety Precautions to be followed when operating or maintaining this equipment, please refer to the equipment's Operating & Maintenance Instructions.

Air inlet bottom screens or solid bottom panels may be desirable or necessary for safety and other reasons depending on the location and conditions at the installation site.

Warranties

Please refer to the Limitation of Warranties applicable to and in effect at the time of the sale/purchase of these products.

Freeze Protection

These products must be protected against damage and/or reduced effectiveness due to possible freeze-up by mechanical and operational methods. Please refer to the Product catalog or contact your B.A.C. Representative for recommended protection alternatives.

Engineering Specifications for Series V and Low Profile Evaporative Condensers

Part 1: General

A. General: Furnish and install, ________ factory assembled evaporative condenser(s) of counterflow blow-through design, with single side entry, conforming in all aspects to the specifications and schedule as shown on the plans.

B. Capacity: The evaporative condenser(s) shall be guaranteed by the manufacturer to have condensing capacity of _____ BTUH heat rejection, operating with ____ refrigerant and ___F condensing temperature and ___F entering wet bulb temperature.

C. Warranty: The manufacturer's standard equipment warranty shall be for a period of one year from the date of startup or eighteen months from the date of shipment, whichever ends first. The manufacturer shall, in addition, provide a 5 year mechanical drive warranty covering the fans, fan shafts, bearings, sheaves, supports, and fan motors.

D. Factory Testing: Equipment manufacturer shall be capable of testing the operation of the condenser in the manufacturer's own test facility. Test facilities shall be capable of simulating design conditions, including but not limited to design wet bulb, air flow, refrigerant mass flow rate, refrigerant condensing temperature, and total heat rejection.

E. Quality Assurance: The manufacture shall have a Management System certified by an accredited registrar as complying with the requirements of ISO-9001 to ensure consistent quality of products and services. Manufacturers that are not ISO-9001 certified shall provide an additional one year warranty to the customer at no additional cost.

Part 2: Products

2.01 Evaporative Condenser Materials and Components

A. General: All steel panels and structural elements shall be constructed from heavy gauge, G-235 (Z700 metric) hot-dip galvanized steel, with cut edges given a protective coating of zinc-rich compound.

2.02 Coil Casing Assembly

A. The evaporative condenser shall include a coil casing section consisting of refrigerant condensing coil, spray water distribution system, and drift eliminators as indicated by the manufacturer.
   1. The refrigerant condensing coil shall be fabricated of all prime surface steel at the manufacturer's own facility, and hot-dip galvanized after fabrication.
      a. The refrigerant condensing coil shall be tested at 375 psig(2687 kPa) air pressure under water.
      b. The refrigerant condensing coil shall be designed for low pressure drop with sloping tubes for free drainage of liquid refrigerant.
   2. Water shall be distributed evenly over the coil at a minimum flow rate of 4.5 gpm/ft^2 (3.1 /(s•m^2)) to ensure complete wetting of the coil at all times by large-diameter, non-clog, 360° plastic distribution nozzles spaced across the coil face area in Schedule 40 PVC spray branches.
      a. Directional nozzles shall not be acceptable.
      b. Spray branches and nozzles shall be held in place by snap-in rubber grommets, allowing quick removal of individual nozzles or complete branches for cleaning or flushing.
      c. Nozzles shall have a minimum of .25" (6.35 mm) protrusion inside the spray branches to ensure unimpeded water flow between regular cleanings of the water distribution system.
   3. Removable PVC drift eliminators shall be positioned to prevent moisture from leaving the evaporative condenser and incorporate a minimum of three (3) changes in air direction to limit drift loss to .001% of total water circulated.

2.03 Pan Assembly

A. The evaporative condenser shall include a pan assembly consisting of cold water basin with pump assembly and fan assemblies with single side air inlet and integral air plenum.
   1. The cold water basin shall include: a drain/clean-out connection; a steel strainer; a brass make-up valve; overflow connection; and a water recirculation pump assembly.
      a. Drain/cleanout connection shall be located in the pan to allow removal of recirculating water.
      b. Lift-out steel strainer shall be supplied with perforated openings sized smaller than the water distribution nozzle orifices and an integral anti-vortexing hood to prevent air entrainment.
      c. Brass make-up valve shall be supplied with a large-diameter plastic float arranged for easy adjustment.
      d. Overflow connection shall be provided in the cold water basin to protect against recirculating water spillage.
      e. Water recirculation pump shall be a close-coupled, bronze-fitted centrifugal pump equipped with a mechanical seal, mounted on the basin and piped from the suction strainer to the water distribution system.
         i. The pump shall be installed so that it may drain freely when the basin is drained.
         ii. The pump assembly shall include an integral metering valve and bleed line to control the bleed rate from the pump discharge to the overflow connection.
         iii. The pump motor shall be totally-enclosed, fan-cooled (TEFC) type suitable for _____ v, ____ phase, ______ Hz. electrical service.
      f. On installations requiring a remote sump, the evaporative condenser shall be modified to accommodate the use of an independent sump and pump for recirculating water (by others)
         i. The recirculating water pump, steel strainer, make-up valve, and integral bleed line assemblies shall be omitted from the evaporative condenser scope of supply.
         ii. The evaporative condenser shall be supplied with a cold water basin outlet sized and located as indicated on the drawings for gravity drain to the remote sump.
         iii. The water distribution system shall have an operating pressure of 2 psig (115 kPa) at the evaporative condenser spray water inlet connection.

VC2 Models–

2. Air shall enter the evaporative condenser through the axial fan assemblies and integral air plenum.
   a. Fans and motors shall be located in the dry entering airstream to provide greater reliability and ease of maintenance.
   b. Fan motors and drives shall be located at the front base of the unit to facilitate access without requiring access to the inside of the unit.
   c. Fan cylinders shall have curved inlets for efficient air entry.
   d. Each fan 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.
   e. Fans shall be heavy-duty, axial flow type with aluminum alloy blades driven by a one-piece, multi-groove neoprene/polyester belt designed for a minimum of 150% of the motor nameplate horsepower.
      i. Fan shafts shall be mounted in heavy-duty, self-aligning, grease-packed relubricatable ball bearings with eccentric locking collars, designed for a minimum L10 life of 40,000 hours.
      ii. Bearing lubrication lines shall be extended to the exterior of the unit.
      iii. Fan and motor sheaves shall be fabricated from corrosion-resistant materials.
   f. Fan motor(s) shall be totally enclosed, fan-cooled (TEFC) type with a 1.15 service factor, suitable for _____ volt, ____ phase, ______ Hz electrical service and shall be mounted on an easily adjusted, heavy-duty motor base.
   g. Integral air plenum shall contain additional guide vanes to ensure uniform airflow into the coil casing section.

VC1 Models–

2. Air shall enter the evaporative condenser through the centrifugal fan assemblies and integral air plenum.
   a. Fans and motors shall be located in the dry entering airstream to provide greater reliability and ease of maintenance.
   b. Fan housings shall have curved inlet rings for efficient air entry and rectangular discharge cowls that extend into the pan to increase fan efficiency and prevent water from entering the fans.
   c. Fan housings on units more than 8' wide shall be split to facilitate the removal of the fan shaft.
   d. Fan(s) shall be heavy-duty, centrifugal flow type mounted on a steel shaft with heavy-duty, self-aligning, relubricatable bearings with cast iron housings, designed for a minimum L10 life of 40,000 hours.
   e. Fan motor(s) shall be totally enclosed, fan-cooled (TEFC) type with a 1.15 service factor, suitable for _____ volt, ____ phase, ______ Hz electrical service and shall be mounted on an easily adjusted, heavy-duty motor base. Special moisture protection shall be furnished on the windings, shafts, and bearings.

VCL Models–

2. Air shall enter the evaporative condenser through the centrifugal fan assemblies and integral air plenum.
   a. Centrifugal fan assemblies shall be located adjacent to the casing and water basin to minimize overall unit height.
   b. Fan housings shall have curved inlet rings for efficient air entry and rectangular discharge cowls which extend into the pan to increase fan efficiency and prevent water from entering the fans.
   c. Fan housings shall be split to facilitate the removal of the fan shaft.
   d. Fan(s) shall be heavy-duty, centrifugal flow type mounted on a steel shaft with heavy-duty, self-aligning, relubricatable bearings with cast iron housings, designed for a minimum L10 life of 40,000 hours.
   e. Fan motor(s) shall be totally enclosed, fan-cooled (TEFC) type with a 1.15 service factor, suitable for _____ volt, ____ phase, ______ Hz electrical service and shall be mounted on an easily adjusted, heavy-duty motor base. Special moisture protection shall be provided on the windings, shafts and bearings.

2.04 Optional Equipment Specifications

A. Evaporative condenser shall be provided with basin heaters to prevent freezing of the pan water when the evaporative condenser is idle.
   1. The basin heaters shall be selected to maintain +40° F (4.4° C) basin water temperature at a 0° F (-17.8° C) ambient temperature and 10 mph (16.1 km/hr) wind speed.
   2. Basin heaters shall be electric immersion type controlled by a remote thermostat with the sensing bulb located in the basin water.
   3. Basin heaters shall be provided with a factory-installed low water level cut-out switch to prevent heater operation unless the heater elements are fully submerged.

B. Evaporative condenser shall be supplied with dedicated motors and drives so that each fan can be cycled independently, and an internal baffle shall be supplied to deter air bypass within the unit.

C. Evaporative condenser shall be provided with a factory assembled, field-installed external platform with an access ladder and handrails complying with OSHA standards and regulations to provide access to the top of the evaporative condenser.
   1. External platform shall have a 24" (610 mm) wide non-skid walking surface and 48" (1220 mm) high safety railings.
   2. Optional ladder safety cage shall be available to meet OSHA requirements as necessary.

E. Evaporative condenser shall be supplied with the ENERGY-MISER® Fan System to improve part load efficiency and provide system redundancy in case of a motor failure.
   1. The ENERGY-MISER® Fan System shall include the main fan motor as listed in the manufacturer's published literature and a pony motor sized for approximately 1/3 of design horsepower and 2/3 of design fan speed to optimize energy savings during non-design load conditions.

Manufacturing Worldwide

Manufacturing facilities are strategically located to support BAC's position as the premier evaporative condenser manufacturer worldwide.

Baltimore Aircoil

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SEN-4M-03/03

Series V
Evaporative Condensers

Product Detail

Series V Evaporative Condensers

Single Model Capacity:
10 – 1,914 Nominal R-22 Tons
(7 – 1,357 Nominal R-717 Tons)

Series V Evaporative Condensers deliver fully rated thermal performance over a wide range of heat rejection and temperature requirements for various refrigerants. VC1 and VCL models can be installed indoors and minimize sound levels, and low profile models (VCL) are available to accommodate limited ceiling or enclosure heights. VC1-C models are designed to fit in standard dry van containers to minimize ocean freight costs. The Series V minimizes installation costs, provides year-round operating reliability, and simplifies maintenance requirements.

Series V Evaporative Condensers

- **Suitable for indoor and outdoor installations (VC1 and VCL models)**
- **Suitable for locations with limited ceiling or enclosure heights (VCL models)**
- **Low sound (VC1 and VCL models)**
- **Low ocean freight costs (VC1-C models)**
- **Lower HP models (VC2 models)**
- **Single side air inlet**
- **Low energy consumption**
- **Low installed cost**
- **Easy maintenance**
- **Reliable year-round operation**
- **Long service life**
- **ASME B31.5 compliant coil**
- **Five-year warranty on mechanical equipment**


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Benefits

Installation and Application Flexibility

- **Indoor Installations —** Centrifugal fan units (VC1 and VCL models) can overcome the static pressure imposed by external ductwork, allowing these units to be installed indoors.

- **Low Profile Models —** The fan section of low profile units (VCL models) is adjacent to the casing section to yield models suitable for use in height sensitive installations. Low profile models are available in capacities from 16 to 299 nominal R-22 tons (11 to 212 nominal R-717 tons), which correspond to heights of 5' 2-1/4" and 8' 4-3/4", respectively.

Low Profile Series V
Evaporative Condenser

Low Sound

- **Single Air Inlet —** Particularly sound-sensitive areas can be accommodated by facing the quiet blank-off panel to the sound-sensitive direction.

- **Centrifugal Fans —** Centrifugal fans units (VC1 and VCL models) have inherently low sound characteristics.

Low Ocean Freight Cost

Size — VC1-C models are designed to fit in standard dry van containers to minimize ocean freight costs.

VC1-C Model in Dry Van Container

Low Energy Consumption

Evaporative cooling equipment minimizes the energy consumption of the entire system because it provides lower operating temperatures. The owner saves money while conserving natural resources and reducing environmental impact. Evaporative condensers provide lower condensing temperatures and can offer significant horsepower savings over conventional air-cooled and water-cooled condensing systems.

Low Installed Cost

- **Support —** All models mount directly on two parallel I-beams and ship complete with motors and drives factory-installed and aligned.
- **Modular Design —** Large models ship in multiple sections to minimize the size and weight of the heaviest lift, allowing for the use of smaller, less costly cranes.

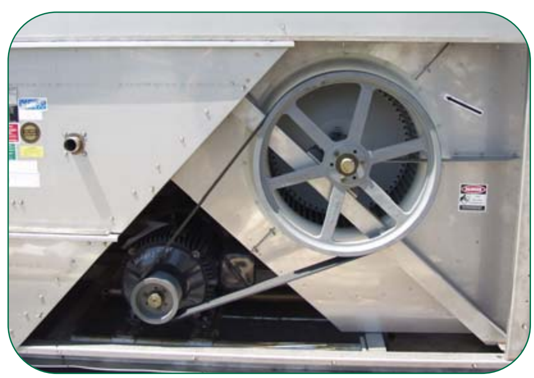
The water level control is easily reached from the access door

Easy Maintenance

Internal Access — The interior of the unit is easily accessible for adjusting the float valve, cleaning the strainer or flushing the basin.

Reliable Year-Round Operation

Drive System — The fans, motor, and drive system are located outside of the moist discharge airstream, protecting them from moisture condensation and icing. Backed by a five-year fan drive and motor warranty, these units are suitable for year-round operation.



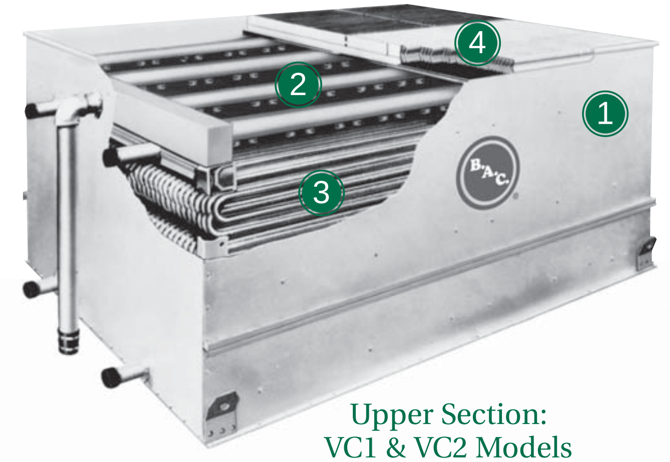
Drive System

Long Service Life

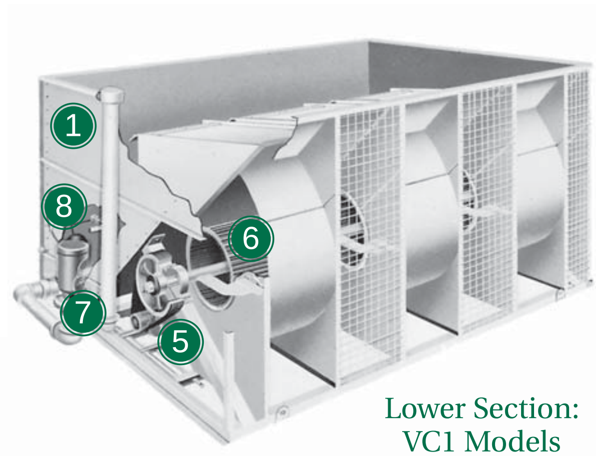
Materials of Construction —Various materials are available to meet the corrosion resistance, unit operating life, and budgetary requirements of any project (see page F14 for construction options).

B.A.C. FAN DRIVE 5 YEAR WARRANTY

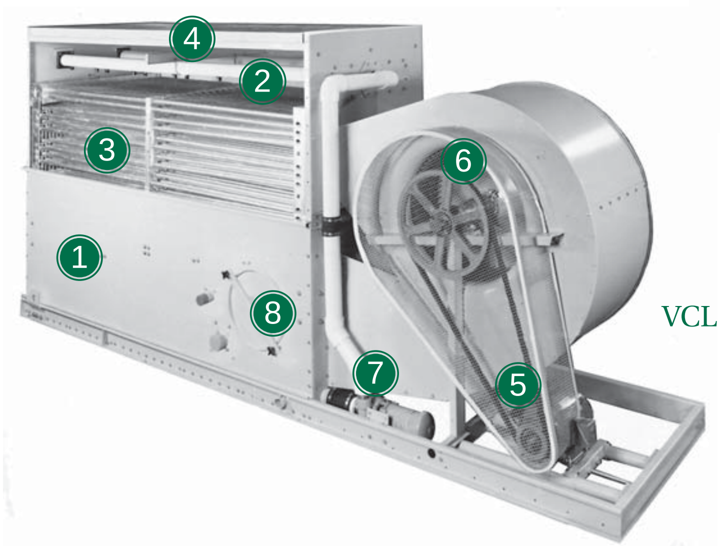
Construction Details



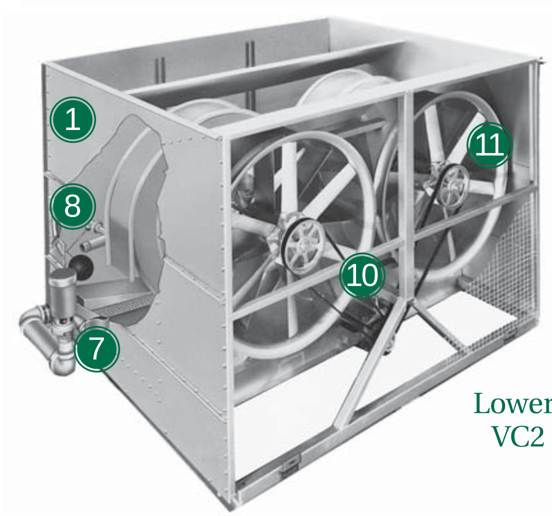
Upper Section:
VC1 & VC2 Models



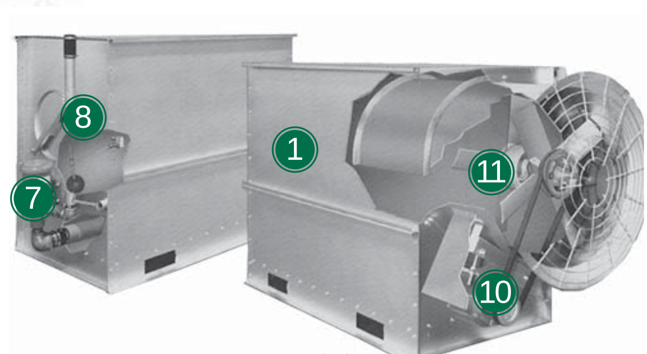
Lower Section:
VC1 Models



VCL Models



Lower Section:
VC2 Models



VC2-N Models

1 Heavy Duty Construction

- G-235 (Z700 metric) hot-dip galvanized steel panels

2 Water Distribution System

- Schedule 40 PVC spray branches
- Large orifice, non-clog nozzles
- Grommetted for easy maintenance

3 Coil

- Continuous serpentine, steel tubing
- Hot-dip galvanized after fabrication (HDGAF)
- Pneumatically tested at 375 psig
- Sloped tubes for free drainage of fluid
- ASME B31.5 compliant
- Orders shipping into Canada are supplied with a CRN

4 Drift Eliminators

- Polyvinyl chloride (PVC)
- Impervious to rot, decay and biological attack
- Flame spread rating of 5 per ASTM E84-77a
- Assembled in easy to handle sections

5 Fan Drive System (VC1/VCL Models)

- V-belt drive
- Heavy-duty bearings (280,000 hour average life)
- Cooling tower duty fan motor
- Five-year motor and drive warranty

B.A.C. FAN DRIVE 5 YEAR WARRANTY

6 Low Sound Centrifugal Fan(s) (VC1/VCL Models)

- Quiet operation

7 Recirculating Spray Pump

- Close coupled, bronze fitted centrifugal pump
- Totally enclosed fan cooled (TEFC) motor
- Bleed line with metering valve installed from pump discharge to overflow

8 Access Door

- Circular access door

9 Strainer (Not Shown)

- Anti-vortexing design to prevent air entrainment

10 Fan Drive System (VC2 Models Only)

- V-belt drive
- Heavy-duty bearings (280,000 hour average life)
- Extended lubrication lines
- Cooling tower duty fan motor
- Five-year motor and drive warranty

B.A.C. FAN DRIVE 5 YEAR WARRANTY

11 Low HP Axial Fan(s) (VC2 Models)

- Corrosion resistant aluminum

Custom Features and Options

Construction Options

- **Standard Construction:**
  Steel panels and structural elements are constructed of heavy-gauge G-235 hot-dip galvanized steel.
- **Optional BALTIBOND® Corrosion Protection System:**
  The BALTIBOND® Corrosion Protection System, a hybrid polymer coating used to extend equipment life, is applied to all hot-dip galvanized steel components of the evaporative condenser (excluding heat transfer coil).
- **Optional Stainless Steel Cold Water Basin:**
  A Type 304 stainless steel cold water basin is provided. This option is available on VC1 and VC2 models only. See the “Optional Water-Contact Stainless Steel Cold Water Basin” for VCL models.
- **Optional Stainless Steel Construction:**
  Steel panels and structural elements are constructed of Type 304 stainless steel.
- **Optional Water-Contact Stainless Steel Cold Water Basin:**
  A cost effective alternative to an all stainless steel cold water basin, all critical components in the cold water basin are provided in Type 304 stainless steel. The remaining components are constructed of the base material of construction (galvanized steel or the BALTIBOND® Corrosion Protection System).
- **Optional Water-Contact Stainless Steel Construction:**
  A cost effective alternative to all stainless steel construction, all components that are exposed to the recirculating water are provided in Type 304 stainless steel. The remaining components are constructed of the base material of construction (galvanized steel or the BALTIBOND® Corrosion Protection System).

See page J4 for more details on the materials described above.

Coil Configurations

- **Standard Serpentine Coil:**
  The standard condensing coil is constructed of continuous lengths of all prime surface steel, hot-dip galvanized after fabrication (HDGAF).
- **Optional Extended Surface Coil:**
  Coils are available with selected rows finned at 5 fins per inch for wet/dry applications. The coil is hot-dip galvanized after fabrication (HDGAF).
- **Optional Stainless Steel Coil:**
  Coils are available in Type 304 stainless steel for specialized applications.

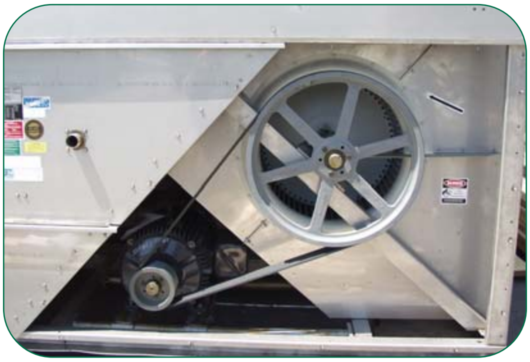
- **Optional ASME "U" Stamp Coil:**
  This coil meets the requirements of the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, and bears the ASME "U" stamp. ASME coils are hot-dip galvanized after fabrication (HDGAF).
- **Multiple Refrigerant Circuit Coils:**
  In general, multiple circuit coils are required primarily on halocarbon refrigerant systems where it is common practice to maintain individual compressor systems. Also, a circuit can be isolated to provide cooling of a water or glycol loop for compressor jacket cooling. A wide range of multiple circuit arrangements are available.

All coils are designed for low pressure drop with sloping tubes for free drainage of fluid. Each coil is pneumatically tested at 375 psig (2586 kPa) and is ASME B31.5 compliant. Orders shipping into Canada are supplied with a CRN.

Other coil configurations are available for specific applications. Contact your local BAC Representative for details.

Fan Drive System

The fan drive system provides the cooling air necessary to reject unwanted heat from the system to the atmosphere.



Standard Drive System, VC1 and VCL models

Dynamically balanced, forwardly curved, centrifugal fans driven by matched V-belts with taper lock sheaves designed for not less than 150% of the motor nameplate horsepower are standard on VC1 and VCL models. Two stage, axial flow fans are mounted in series in a close-fitting cylinder with a smooth contoured inlet ring and intermediate guide vanes to maximize fan efficiency on VC2 models.

Cooling tower duty fan motors, custom engineered for BAC to provide maximum performance for evaporative cooling service, are provided and backed by BAC's comprehensive five-year motor and fan drive warranty.

Standard Drive System, VC2 models

Custom Features and Options

ENERGY-MISER® Fan System

ENERGY-MISER® Fan System

The ENERGY-MISER® Fan System (available on VC1 and VCL models only) consists of two standard single-speed fan motor and drive assemblies. One drive assembly is sized for full speed and load, and the other is sized approximately 2/3 speed and consumes only 1/3 the design horsepower. This configuration allows the system to be operated like a two-speed motor, but with the reserve capacity of a standby motor in the event of failure. As a minimum, approximately 70% capacity will be available from the low horsepower motor, even on a design wet-bulb day. Controls and wiring are the same as those required for a two-speed, two-winding motor. Significant energy savings are achieved when operating at low speed during periods of reduced load and/or low wet-bulb temperatures.

Independent Fan Operation (VC2 Models Only)

VC2 models with multiple fan assemblies are provided with one fan motor driving two fans as standard. The Independent Fan option consists of one fan motor and drive assembly for each fan to allow independent operation, adding redundancy and an additional step of fan cycling and capacity control.

Low Sound Alternatives

The low sound levels generated by Series V Evaporative Condensers make them suitable for most installations. For situations when one direction is particularly sound sensitive, the unit can be oriented so that the side opposite the air inlet faces the sound-sensitive direction. VC1 and VCL models are also available with factory designed, tested and rated sound attenuation for both the air inlet and discharge.

Accessories

Ladder, Safety Cage, Gate and Handrails (VC1 and VC2 Models Only)

In the event the end-user elects to provide access to the top of the unit, VC1 and VC2 models can be furnished with ladders extending from the base of the unit to the top, as well as safety cages, safety gates and handrail packages. All components are designed to meet OSHA requirements. All access to the top of the equipment must be made in accordance with applicable governmental occupational safety standards.

NOTE: *When these access options are employed, the condenser must be equipped with steel drift eliminators*

External Platform (Models VC1-386 thru -1608 and VC2-319 thru -1914 Only)

Models VC1-386 thru -1608 and VC2-319 thru -1914 can be provided with an external platform for easy access to the drift eliminators and spray system of the unit. Safety gates are available for handrail openings. All components are designed to meet OSHA requirements.

Vibration Cutout Switch

A factory mounted vibration cutout switch is available to effectively protect against equipment failure due to excessive vibration of the mechanical equipment system. BAC can provide either a mechanical or solid-state electronic vibration cutout switch in a NEMA 4 enclosure to ensure reliable protection. Additional contacts can be provided to activate an alarm.

Electric Water Level Control Package

The electric water level control replaces the standard mechanical make-up valve when a more precise water level control is required. This package consists of a conductance-actuated level control mounted in the basin and a solenoid activated valve in the make-up water line. The valve is slow closing to minimize water hammer.

Electric Water Level Control Package

Extended Lubrication Lines

Extended lubrication lines with grease fittings located outside the fan section are available for lubrication of the fan shaft bearings (this option is standard on VC2 models).

Accessories

Basin Heaters

Units exposed to below freezing ambient temperatures require protection to prevent freezing of the water in the cold water basin when the unit is idle. Factory installed heaters, which maintain +40°F (4.4°C) water temperature, are a simple and inexpensive way of providing such protection.

Heater Sizing Data

MODEL NUMBERS	0ºF (-17.8°C) AMBIENT HEATERS		-20ºF (-28.9°C) AMBIENT HEATERS	
	No. of HEATERS	kW per HEATER	No. of HEATERS	kW per HEATER
VC1-10 thru 25	1	2	1	2
VC1-30 thru 65	1	2	1	2
VC1-72 thru 90	1	2	1	3
VC1-100 thru 135	1	3	1	5
VC1-150 thru 205	1	3	1	5
VC1-N208 thru N230	1	5	1	7.5
VC1-N243 thru N315	1	5	1	7.5
VC1-C216 thru C320	1	5	1	7.5
VC1-N338 thru N470	1	7	1	10
VC1-C334 thru C469	1	5	1	7.5
VC1-386 thru 516	1	8	1	10
VC1-540 thru 804	1	12	1	16
VC1-772 thru 1032	2	8	2	10
VC1-1158 thru 1608	2	12	2	16
VC2-N138 thru N191	1	5	1	9
VC2-N206 thru N235	1	7	1	10
VC2-N261 thru N301	1	8	1	10
VC2-N356 thru N446	1	12	1	16
VC2-342 thru 626	1	10	1	16
VC2-526 thru 957	1	16	1	20
VC2-N870 thru N1204	2	10	2	16
VC2-684 thru 1252	2	10	2	16
VC2-1052 thru 1914	2	16	2	20
VCL-016 thru 035	1	2	1	2
VCL-038 thru 079	1	3	1	4
VCL-087 thru 120	1	4	1	5
VCL-134 thru 155	1	5	1	7
VCL-167 thru 234	1	7	1	9
VCL-257 thru 299	1	9	1	12

Bottom Screens

For information on other options and accessories, please contact your local BAC Representative.

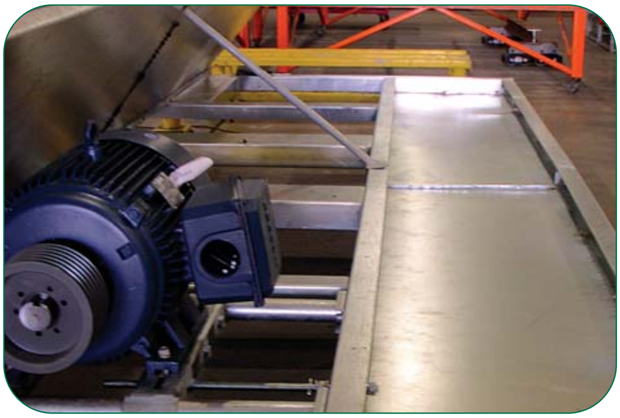
Wire mesh screens are available factory-installed over the bottom openings to prevent unauthorized access.

Basin Sweeper Piping

Basin sweeper piping is an effective method of eliminating sediment that may collect in the cold water basin of the tower. A piping system is provided for connection to side stream filtration equipment (by others) with a supply pressure of 10-20 psig.

Capacity Control Dampers (VC1 and VCL Models Only)

Modulating capacity control dampers are available to provide better leaving water temperature control than can be obtained from fan cycling alone. A standard electrical control package for dampers is available.



Solid Bottom Panels

Solid Bottom Panels

Factory-installed bottom panels are required when intake air is ducted to the unit.

Copper Sweat Fittings

Copper Sweat Fittings

Optional copper sweat fittings are available to simplify field piping.

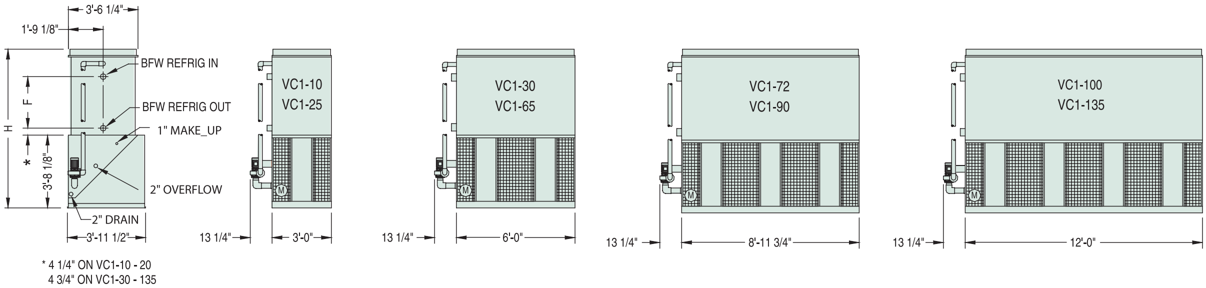
Subcooling Coils

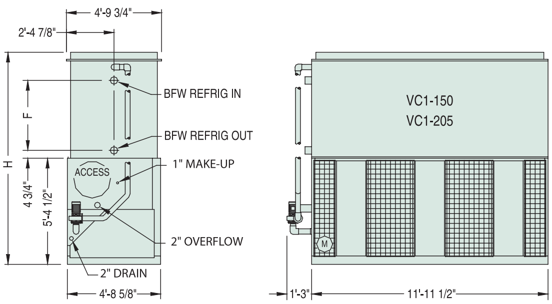
Subcooling coils are available for those halocarbon refrigerant installations where subcooled refrigerant is specified, or where the pressure drop or a vertical rise in the liquid line is great enough to cause excessive flashing. Standard subcooling coil sections provide approximately 10ºF of subcooling at standard conditions. Subcooling sections are approximately 7" high and are mounted between the coil and pan/fan sections. Coils are hot-dip galvanized after fabrication and pneumatically tested at 375 psig.

Series V

VC1 Engineering Data

Do not use for construction. Refer to factory certified dimensions. This brochure includes data current at time of publication, which should be reconfirmed at the time of purchase. Up-to-date engineering data, free product selection software, and more can be found at **www.BaltimoreAircoil.com**.





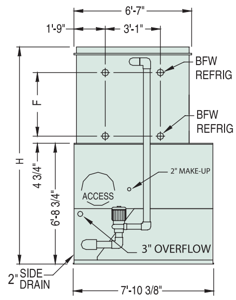
See page J16 for information on sizing a remote sump tank.

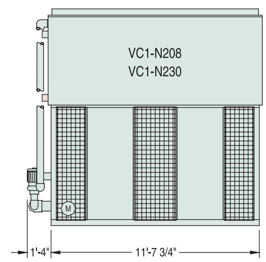
MODEL NUMBER[1]	R-717 TONS[2]	MOTOR HP		AIRFLOW (CFM)	WEIGHT (LBS)			DIMENSIONS		R-717 OPERATING CHARGE[7] (LBS)	INTERNAL COIL VOLUME (FT^3)
		FAN[3]	PUMP		OPERATING[4]	SHIPPING	HEAVIEST SECTION[5]	H	F		
VC1-10	7	1/2	1/3	2,900	1,400	1,270	*1,270	79 1/4"	14 1/4"	19	2
VC1-15	11	1	1/3	3,800	1,600	1,460	*1,460	87 3/4"	22 3/4"	25	2.7
VC1-20	14	1 1/2	1/3	4,400	1,770	1,620	1,000	96 1/4"	31 1/2"	32	3.5
VC1-25	18	3	1/3	5,300	1,820	1,670	1,050	96 1/4"	31 1/4"	34	3.5
VC1-30	21	3	1/2	8,200	2,300	2,010	*2,010	79 1/4"	13 1/4"	35	3.5
VC1-38	27	3	1/2	8,900	2,560	2,240	*2,240	87 3/4"	21 3/4"	45	5.0
VC1-46	33	3	1/2	8,500	2,880	2,540	1,650	96 1/4"	30 1/4"	61	6.5
VC1-52	37	5	1/2	10,200	2,930	2,590	1,700	96 1/4"	30 1/4"	65	6.5
VC1-58	41	5	1/2	9,800	3,230	2,860	1,940	104 3/4"	38 3/4"	76	8.0
VC1-65	46	7 1/2	1/2	11,600	3,300	2,930	2,010	104 3/4"	38 3/4"	80	8.0
VC1-72	51	5	3/4	12,300	4,210	3,510	2,400	99 1/4"	33 1/4"	90	9.6
VC1-80	57	7 1/2	3/4	14,500	4,280	3,580	2,470	99 1/4"	33 1/4"	100	9.6
VC1-90	64	7 1/2	3/4	14,000	4,750	4,000	2,850	108 1/2"	42 1/2"	110	12
VC1-100	71	7 1/2	1	19,600	5,420	4,450	3,060	99 1/4"	33 1/4"	120	13
VC1-110	78	10	1	22,000	5,500	4,530	3,140	99. 1/4"	33 1/4"	130	13
VC1-125	89	10	1	21,000	6,080	5,060	3,640	108 1/2"	42 1/2"	145	16
VC1-135	96	15	1	23,000	6,160	5,180	3,640	108 1/2"	42 1/2"	145	16
VC1-150	106	10	1 1/2	28,200	8,730	7,480	4,920	119 5/8"	33 1/4"	170	18
VC1-165	117	10	1 1/2	27,200	9,680	8,060	5,830	128 7/8"	42 1/2"	210	23
VC1-185	131	15	1 1/2	33,300	9,770	8,170	5,930	128 7/8"	42 1/2"	210	23
VC1-205	145	20	1 1/2	35,800	10,420	8,820	6,580	138 1/8"	51 3/4"	245	27

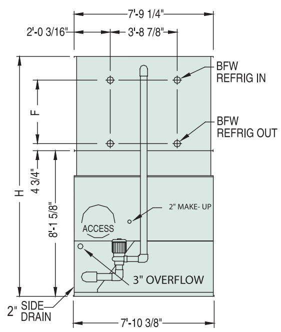
Notes:

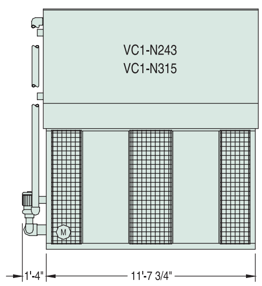
1. Model number denotes nominal tons using R-22 at a 105ºF condensing temperature, a 40ºF suction temperature, and a 78ºF wet-bulb temperature.
2. R-717 tons are at a 96.3ºF condensing temperature, a 20ºF suction temperature, and a 78ºF wet-bulb temperature.
3. Fan horsepower is at 0" external static pressure.
4. Operating weight shown is based on total unit weight, weight of refrigerant operating charge, and cold water basin filled to the overflow level.
5. Unless otherwise noted by asterisk, the coil section is the heaviest section.
6. Standard refrigerant connection sizes are 3-inch BFW inlet and outlet for VC1-10 through -25, and 4" BFW inlet and outlet for all other models.
7. Refrigerant charge listed is R-717 operating charge. To determine operating charge for R-22, multiply charge by 1.93. For R-134a, multiply by 1.98.

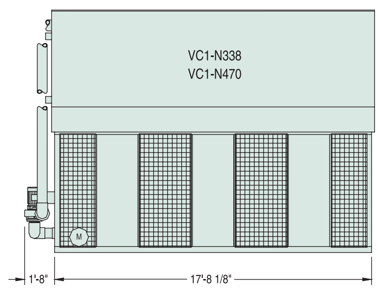
See page F58 for Engineering Considerations.











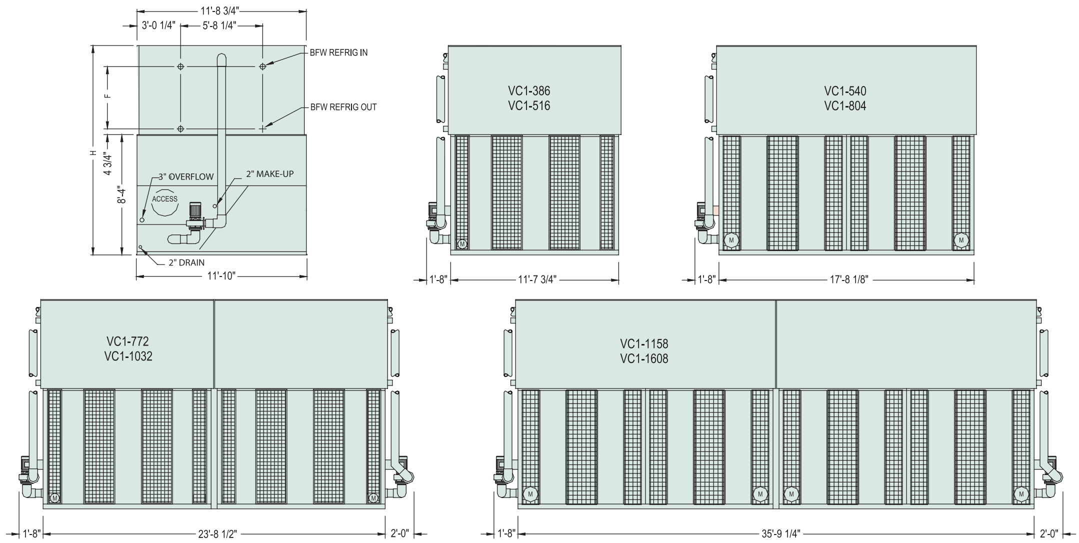
MODEL NUMBER[1]	R-717 TONS[2]	MOTOR HP		AIRFLOW (CFM)	WEIGHT (LBS)			DIMENSIONS		R-717 OPERATING CHARGE (LBS)	INTERNAL COIL VOLUME (FT^3)
		FAN[3]	PUMP		OPERATING[4]	SHIPPING	HEAVIEST SECTION[5]	H	F		
VC1-N208	148	15	2	39,650	13,710	10,170	6,580	135 7/8"	33 1/4"	230	25
VC1-N230	163	15	2	38,550	15,000	11,410	8,220	145 1/4"	42 1/2"	245	31
VC1-N243	172	20	3	46,150	15,140	10,720	7,050	153 1/4"	33 1/4"	290	32
VC1-N257	182	25	3	49,700	15,190	10,770	7,050	153 1/4"	33 1/4"	290	32
VC1-N275	195	20	3	44,800	16,700	12,130	8,460	162 3/8"	42 1/2"	360	40
VC1-N301	213	25	3	47,150	18,210	13,580	9,860	171 5/8"	51 3/4"	430	47
VC1-N315	223	30	3	50,100	18,230	13,600	9,860	171 5/8"	51 3/4"	430	47
VC1-N338	240	20	5	60,450	22,360	15,630	10,390	153 1/4"	33 1/4"	435	48
VC1-N357	253	25	5	65,100	22,410	15,680	10,390	153 1/4"	33 1/4"	435	48
VC1-N373	265	30	5	69,200	22,430	15,700	10,390	153 1/4"	33. 1/4"	435	48
VC1-N417	296	30	5	67,200	24,820	17,880	12,570	162 3/8"	42 1/2"	540	59
VC1-N470	333	40	5	72,250	27,410	20,250	14,750	171 5/8"	51 3/4"	645	71

Notes:

1. Model number denotes nominal tons using R-22 at a 105ºF condensing temperature, a 40ºF suction temperature, and a 78ºF wet-bulb temperature.
2. R-717 tons are at a 96.3ºF condensing temperature, a 20ºF suction temperature, and a 78ºF wet-bulb temperature.
3. Fan horsepower is at 0" external static pressure.
4. Operating weight shown is based on total unit weight, weight of refrigerant operating charge, and cold water basin filled to the overflow level.
5. The coil section is the heaviest section.
6. Standard refrigerant connection size is 4" BFW (inlet and outlet).
7. Refrigerant charge listed is R-717 operating charge. To determine operating charge for R-22, multiply charge by 1.93. For R-134a, multiply by 1.98.

VC1 Engineering Data

Do not use for construction. Refer to factory certified dimensions. This brochure includes data current at time of publication, which should be reconfirmed at the time of purchase. Up-to-date engineering data, free product selection software, and more can be found at **www.BaltimoreAircoil.com**.



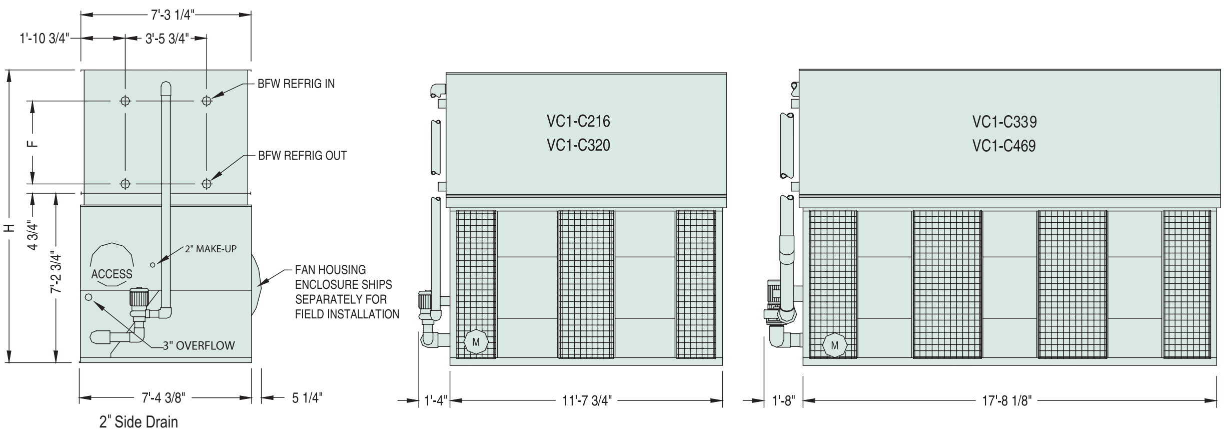
MODEL NUMBER [1]	R-717 TONS [2]	MOTOR HP		AIRFLOW (CFM)	WEIGHT (LBS)			DIMENSIONS		R-717 OPERATING CHARGE (LBS)	INTERNAL COIL VOLUME (FT³)
		FAN [3]	PUMP		OPERATING [4]	SHIPPING	HEAVIEST SECTION [5]	H	F		
VC1-386	274	30	5	74,250	23,860	15,810	10,300	155 1/"	33 1/4"	445	49
VC1-436	309	30	5	72,050	26,140	17,880	12,370	164 3/4"	42 1/2"	550	60
VC1-467	331	40	5	79,300	26,330	18,070	12,370	164 3/4"	42 1/2"	550	60
VC1-454	322	30	5	70,400	28,430	19,950	14,440	174"	51 3/4"	655	72
VC1-487	345	40	5	77,500	28,620	20,140	14,440	174"	51 3/4"	655	72
VC1-516	366	50	5	83,450	28,660	20,180	14,440	174"	51 3/4"	655	72
VC1-540	383	(2) 15	5	97,250	35,090	22,850	15,170	155 1/2"	33 1/4"	665	72
VC1-579	411	(2) 20	5	107,050	35,110	22,870	15,170	155 1/2"	33 1/4"	665	72
VC1-612	434	(2) 25	5	115,300	35,210	22,970	15,170	155 1/2"	33 1/4"	665	72
VC1-646	458	(2) 20	5	103,900	38,560	25,990	18,290	164 3/4"	42 1/2"	825	90
VC1-683	484	(2) 25	5	111,950	38,660	26,090	18,290	164 3/4"	42 1/2"	825	90
VC1-715	507	(2) 30	5	118,950	38,700	26,130	18,290	164 3/4"	42 1/2"	825	90
VC1-748	530	(2) 30	5	116,200	42,140	29,240	21,400	174"	51 3/4"	990	108
VC1-804	570	(2) 40	5	127,900	42,520	29,620	21,400	174"	51 3/4"	990	108
VC1-772	548	(2) 30	(2) 5	148,500	47,930	31,560	*10,960	155 1/2"	33 1/4"	890	98
VC1-872	618	(2) 30	(2) 5	144,100	52,490	35,700	12,370	164 3/4"	42 1/2"	1,100	121
VC1-934	662	(2) 40	(2) 5	158,600	52,870	36,080	12,370	164 3/4"	42 1/2"	1,100	121
VC1-908	644	(2) 30	(2) 5	140,800	57,070	39,840	14,440	174"	51 3/4"	1,310	144
VC1-974	691	(2) 40	(2) 5	155,000	57,450	40,220	14,440	174"	51 3/4"	1,310	144
VC1-1032	732	(2) 50	(2) 5	166,900	57,530	40,300	14,440	174"	51 3/4"	1,310	144
VC1-1158	821	(4) 20	(2) 5	214,100	70,450	45,710	*15,340	155 1/2"	33 1/4"	1,330	146
VC1-1224	868	(4) 25	(2) 5	230,600	70,650	45,910	*15,540	155 1/2"	33 1/4"	1,330	146
VC1-1366	969	(4) 25	(2) 5	223,900	77,520	52,120	18,290	164 3/4"	42 1/2"	1,650	181
VC1-1430	1014	(4) 30	(2) 5	237,900	77,600	52,200	18,290	164 3/4"	42 1/2"	1,650	181
VC1-1496	1061	(4) 30	(2) 5	232,400	84,480	58,420	21,400	174"	51 3/4"	1,980	216
VC1-1608	1140	(4) 40	(2) 5	255,800	85,240	59,180	21,400	174"	51 3/4"	1,980	216

Notes:

1. Model number denotes nominal tons using R-22 at a 105ºF condensing temperature, a 40ºF suction temperature, and a 78ºF wet-bulb temperature.
2. R-717 tons are at a 96.3ºF condensing temperature, a 20ºF suction temperature, and a 78ºF wet-bulb temperature.
3. Fan horsepower is at 0" external static pressure.
4. Operating weight shown is based on total unit weight, weight of refrigerant operating charge, and cold water basin filled to the overflow level.
5. Unless otherwise noted by asterisk, the coil section is the heaviest section.
6. Standard refrigerant connection size is 4" BFW (inlet and outlet).
7. Refrigerant charge listed is R-717 operating charge. To determine operating charge for R-22, multiply charge by 1.93. For R-134a, multiply by 1.98.

See page F58
for Engineering
Considerations.

Designed to minimize ocean freight costs, VC1-C models fit in standard dry van containers.



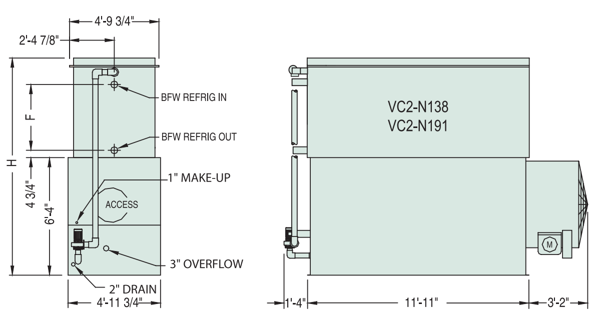
MODEL NUMBER[1]	R-717 TONS[2]	MOTOR HP		AIRFLOW (CFM)	WEIGHT (LBS)			DIMENSIONS		R-717 OPERATING CHARGE (LBS)	INTERNAL COIL VOLUME (FT^3)
		FAN[3]	PUMP		OPERATING[4]	SHIPPING	HEAVIEST SECTION[5]	H	F		
VC1-C216	153	15	3	40,060	14,880	10,270	6,680	142 1/4"	33 1/4"	265	29
VC1-C231	164	20	3	44,090	14,890	10,280	6,680	142 1/4"	33 1/4"	265	29
VC1-C242	172	15	3	38,870	16,300	11,560	7,970	151 1/2"	42 1/2"	330	36
VC1-C260	184	20	3	42,790	16,310	11,570	7,970	151 1/2"	42 1/2"	330	36
VC1-C274	194	25	3	46,090	16,360	11,620	7,970	151 1/2"	42 1/2"	330	36
VC1-C286	203	30	3	48,980	16,380	11,640	7,970	151 1/2"	42 1/2"	330	36
VC1-C299	212	30	3	47,830	17,720	12,920	9,250	160 3/4"	51 3/4"	390	43
VC1-C320	227	40	3	52,650	17,910	13,110	9,250	160 3/4"	51 3/4"	390	43
VC1-C339	241	25	5	62,180	22,040	15,050	9,830	142 1/4"	33 1/4"	395	43
VC1-C354	251	30	5	66,080	22,060	15,070	9,830	142 1/4"	33 1/4"	395	43
VC1-C380	269	40	5	72,730	22,250	15,260	9,830	142 1/4"	33 1/4"	395	43
VC1-C396	281	30	5	64,180	24,240	17,050	11,810	151 1/2"	42 1/2"	490	54
VC1-C424	301	40	5	70,640	24,430	17,240	11,810	151 1/2"	42 1/2"	490	54
VC1-C445	316	40	5	69,020	26,630	19,240	13,810	160 3/4"	51 3/4"	590	64
VC1-C469	333	50	5	74,340	26,670	19,280	13,810	160 3/4"	51 3/4"	590	64

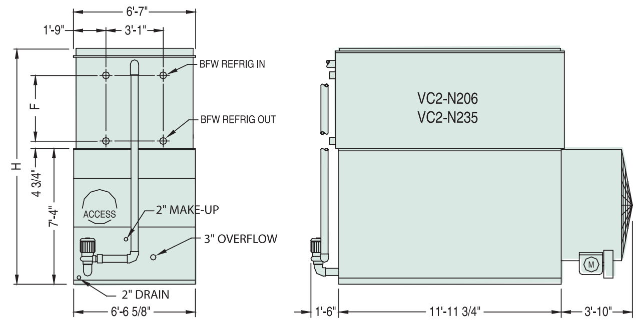
Notes:

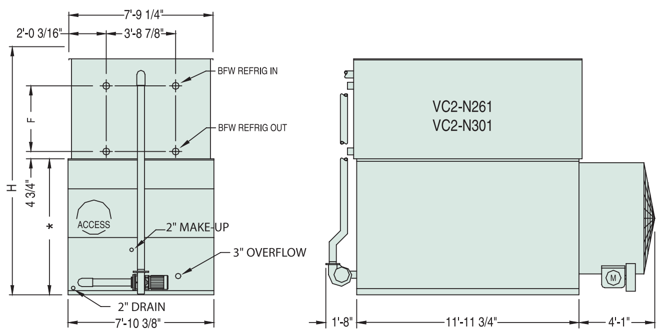
1. Model number denotes nominal tons using R-22 at a 105ºF condensing temperature, a 40ºF suction temperature, and a 78ºF wet-bulb temperature.
2. R-717 tons are at a 96.3ºF condensing temperature, a 20ºF suction temperature, and a 78ºF wet-bulb temperature.
3. Fan horsepower is at 0" external static pressure.
4. Operating weight shown is based on total unit weight, weight of refrigerant operating charge, and cold water basin filled to the overflow level.
5. The coil section is the heaviest section.
6. Standard refrigerant connection size is 4" BFW (inlet and outlet).
7. Refrigerant charge listed is R-717 operating charge. To determine operating charge for R-22, multiply charge by 1.93. For R-134a, multiply by 1.98.

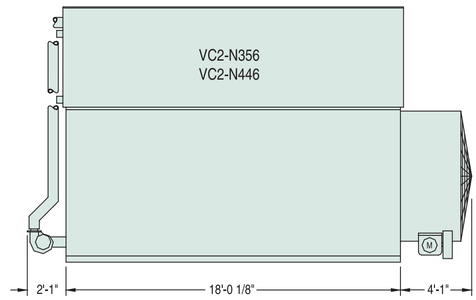
VC2 Engineering Data

Do not use for construction. Refer to factory certified dimensions. This brochure includes data current at time of publication, which should be reconfirmed at the time of purchase. Up-to-date engineering data, free product selection software, and more can be found at **www.BaltimoreAircoil.com**.









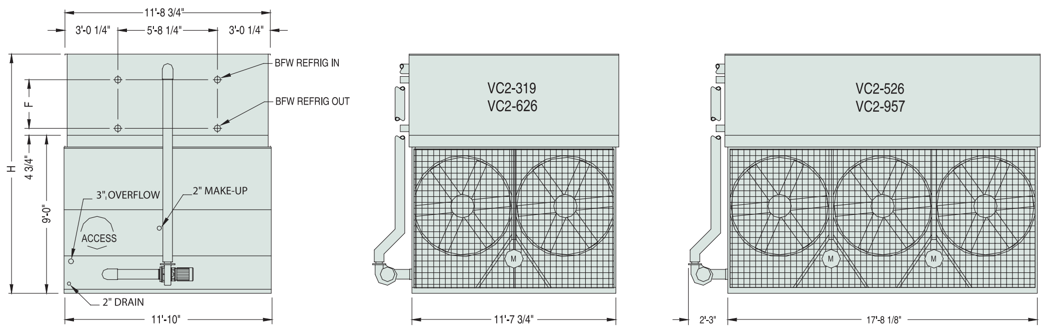
* 7' 4" ON MODELS VC2-N206 - N301
8' 4" ON MODELS VC2-N356 - N446

MODEL NUMBER[1]	R-717 TONS[2]	MOTOR HP		AIRFLOW (CFM)	WEIGHT (LBS)			DIMENSIONS		R-717 OPERATING CHARGE (LBS)	INTERNAL COIL VOLUME (FT^3)
		FAN[3]	PUMP		OPERATING[4]	SHIPPING	HEAVIEST SECTION[5]	H	F		
VC2-N138	98	5	1 1/2	25,900	8,920	7,130	4,920	131 1/8"	33 1/4"	170	18
VC2-N150	106	7 1/2	1 1/2	28,300	9,010	7,220	5,830	131 1/8"	33 1/4"	190	18
VC2-N170	121	7 1/2	1 1/2	28,000	9,930	8,120	5,930	140 3/8"	42 1/2"	210	23
VC2-N191	135	10	1 1/2	30,100	10,580	8,770	6,580	149 5/8"	51 3/4"	245	27
VC2-N206	146	10	2	39,650	14,950	9,960	6,580	143 1/4"	33 1/4"	230	25
VC2-N215	152	7 1/2	2	35,050	16,180	11,190	7,810	152 3/4"	42 1/2"	290	31
VC2-N235	167	10	2	38,750	16,200	11,210	7,810	152 3/4"	42 1/2"	290	31
VC2-N261	185	10	3	43,400	15,380	11,860	8,460	152 3/4"	42 1/2"	360	40
VC2-N301	213	15	3	48,550	16,970	13,310	9,860	162"	51 3/4"	430	47
VC2-N356	252	15	5	67,650	20,260	15,170	10,390	155 1/2"	33 1/4"	435	48
VC2-N396	281	15	5	65,700	22,650	17,350	12,570	164 3/4"	42 1/2"	540	59
VC2-N416	295	15	5	64,200	25,050	19,530	14,750	174"	51 3/4"	645	71
VC2-N446	316	20	5	70,650	25,060	19,540	14,750	174"	51 3/4"	645	71

Notes:

1. Model number denotes nominal tons using R-22 at a 105ºF condensing temperature, a 40ºF suction temperature, and a 78ºF wet-bulb temperature.
2. R-717 tons are at a 96.3ºF condensing temperature, a 20ºF suction temperature, and a 78ºF wet-bulb temperature.
3. Operating weight shown is based on total unit weight, weight of refrigerant operating charge, and cold water basin filled to the overflow level.
4. The coil section is the heaviest section.
5. Standard refrigerant connection size is 4" BFW (inlet and outlet).
6. Refrigerant charge listed is R-717 operating charge. To determine operating charge for R-22, multiply charge by 1.93. For R-134a, multiply by 1.98.

See page F58
for Engineering
Considerations.



MODEL NUMBER[1]	R-717 TONS[2]	MOTOR HP		AIRFLOW (CFM)	WEIGHT (LBS)			DIMENSIONS		R-717 OPERATING CHARGE (LBS)	INTERNAL COIL VOLUME (FT^3)
		FAN[3]	PUMP		OPERATING[4]	SHIPPING	HEAVIEST SECTION[5]	H	F		
VC2-319	226	7.5	5	54,300	24,590	15,240	10,300	163 1/2"	33 1/4"	445	49
VC2-342	243	10	5	59,750	24,640	15,290	10,300	163 1/2"	33 1/4"	445	49
VC2-377	267	15	5	68,400	24,690	15,340	10,300	163 1/2"	33 1/4"	445	49
VC2-420	298	15	5	68,400	26,970	17,410	12,370	172 3/4"	42 1/2"	550	60
VC2-451	320	20	5	73,100	26,980	17,420	12,370	172 3/4"	42 1/2"	550	60
VC2-471	334	20	5	71,400	29,010	19,450	14,400	182"	51 3/4"	675	72
VC2-491	348	25	5	76,950	29,030	19,470	14,400	182"	51 3/4"	675	72
VC2-513	364	30	5	81,750	29,050	19,490	14,400	182"	51 3/4"	675	72
VC2-541	384	30	5	81,500	30,510	20,870	15,780	182"	51 3/4"	750	80
VC2-580	411	40	5	89,700	30,700	21,060	15,780	182"	51 3/4"	750	80
VC2-585	415	30	5	77,040	33,445	22,740	18,205	194 1/4"	61"	875	93
VC2-626	444	40	5	85,200	33,500	22,795	18,205	194 1/4"	61"	875	93
VC2-526	373	10 & 5	5	89,700	36,430	22,220	15,170	163 1/2"	33 1/4"	665	73
VC2-581	412	15 & 7.5	5	102,650	36,540	22,330	15,170	163 1/2"	33 1/4"	665	73
VC2-623	442	20 & 10	5	113,000	36,560	22,350	15,170	163 1/2"	33 1/4"	665	73
VC2-642	455	15 & 7.5	5	99,600	39,990	25,450	18,290	172 3/4"	42 1/2"	825	90
VC2-688	488	20 & 10	5	109,650	40,010	25,470	18,290	172 3/4"	42 1/2"	825	90
VC2-711	504	20 & 10	5	107,150	43,450	28,580	21,400	182"	51 3/4"	990	108
VC2-752	533	25 & 15	5	115,400	43,550	28,680	21,400	182"	51 3/4"	990	108
VC2-785	557	30 & 15	5	122,650	43,570	28,700	21,400	182"	51 3/4"	990	108
VC2-827	587	30 & 15	5	122,200	45,760	30,780	23,480	182"	51 3/4"	1,100	120
VC2-887	629	40 & 20	5	134,500	45,960	30,980	23,480	182"	51 3/4"	1,100	120
VC2-895	635	30 & 15	7.5	115,000	49,895	33,655	27,160	194 1/4"	61"	1,290	140
VC2-957	679	40 & 20	7.5	126,080	50,005	33,765	27,160	194 1/4"	61"	1,290	140

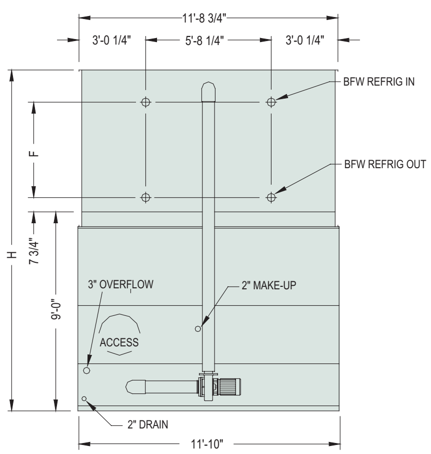
Notes:

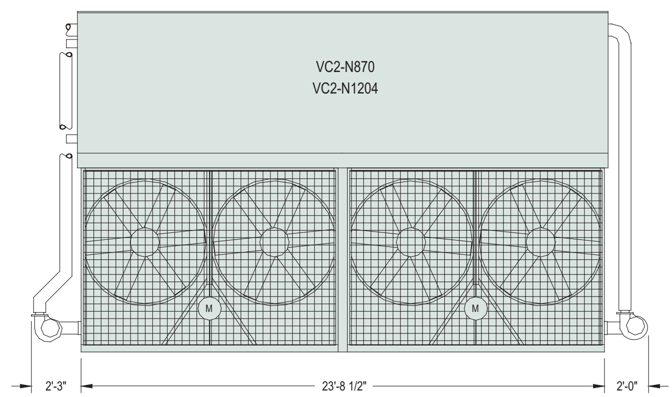
1. Model number denotes nominal tons using R-22 at a 105ºF condensing temperature, a 40ºF suction temperature, and a 78ºF wet-bulb temperature.
2. R-717 tons are at a 96.3ºF condensing temperature, a 20ºF suction temperature, and a 78ºF wet-bulb temperature.
3. Operating weight shown is based on total unit weight, weight of refrigerant operating charge, and cold water basin filled to the overflow level.
4. Unless otherwise noted, the coil section is the heaviest section.
5. Standard refrigerant connection size is 4" BFW (inlet and outlet).
6. Refrigerant charge listed is R-717 operating charge. To determine operating charge for R-22, multiply charge by 1.93. For R-134a, multiply by 1.98.

VC2 Engineering Data

Do not use for construction. Refer to factory certified dimensions. This brochure includes data current at time of publication, which should be reconfirmed at the time of purchase. Up-to-date engineering data, free product selection software, and more can be found at **www.BaltimoreAircoil.com**.

Designed to minimize refrigerant piping, these models have coil connections on just one end.





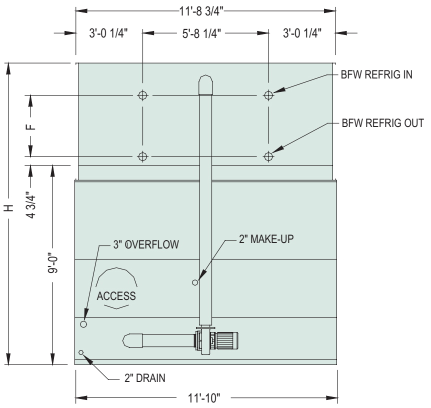
MODEL NUMBER[1]	R-717 TONS[2]	MOTOR HP		AIRFLOW (CFM)	WEIGHT (LBS)			DIMENSIONS		R-717 OPERATING CHARGE (LBS)	INTERNAL COIL VOLUME (FT^3)
		FAN[3]	PUMP		OPERATING[4]	SHIPPING	HEAVIEST SECTION[5]	H	F		
VC2-N870	617	(2) 15	(2) 5	132,800	53,195	32,325	23,855	175 3/4"	42 1/2"	1,100	112
VC2-N932	661	(2) 20	(2) 5	146,200	53,285	32,415	23,855	175 3/4"	42 1/2"	1,100	112
VC2-N1000	709	(2) 25	(2) 5	163,100	53,595	32,725	23,855	175 3/4"	42 1/2"	1,100	112
VC2-N1071	760	(2) 30	(2) 5	163,500	58,445	38,595	27,795	185"	51 3/4"	1,350	136
VC2-N1124	797	(2) 30	(2) 5	160,230	61,480	39,610	30,510	185"	51 3/4"	1,510	150
VC2-N1204	854	(2) 40	(2) 5	176,340	61,610	39,740	30,510	185"	51 3/4"	1,510	150

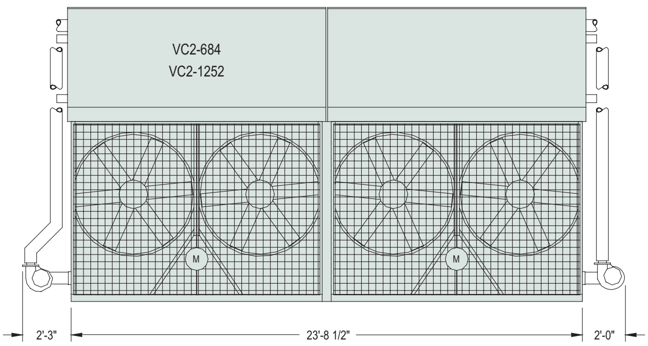
Notes:

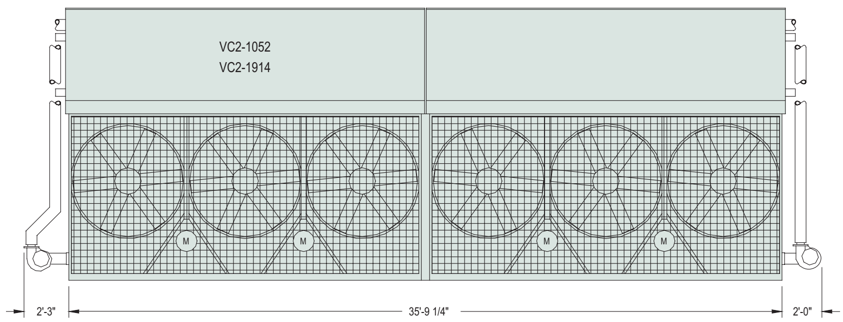
1. Model number denotes nominal tons using R-22 at a 105ºF condensing temperature, a 40ºF suction temperature, and a 78ºF wet-bulb temperature.
2. R-717 tons are at a 96.3ºF condensing temperature, a 20ºF suction temperature, and a 78ºF wet-bulb temperature.
3. Operating weight shown is based on total unit weight, weight of refrigerant operating charge, and cold water basin filled to the overflow level.
4. The coil section is the heaviest section.
5. Standard refrigerant connection size is 4" BFW (inlet and outlet).
6. Refrigerant charge listed is R-717 operating charge. To determine operating charge for R-22, multiply charge by 1.93. For R-134a, multiply by 1.98.

See page F58 for Engineering Considerations.

Evaporative Condensers







MODEL NUMBER[1]	R-717 TONS[2]	MOTOR HP		AIRFLOW (CFM)	WEIGHT (LBS)			DIMENSIONS		R-717 OPERATING CHARGE (LBS)	INTERNAL COIL VOLUME (FT^3)
		FAN[3]	PUMP		OPERATING[4]	SHIPPING	HEAVIEST SECTION[5]	H	F		
VC2-684	485	(2) 10	(2) 5	119,500	49,580	30,570	10,300	163 1/2"	33 1/4"	890	98
VC2-754	535	(2) 15	(2) 5	136,800	49,680	30,670	10,300	163 1/2"	33 1/4"	890	98
VC2-840	596	(2) 15	(2) 5	132,800	54,240	34,810	12,370	172 3/4"	42 1/2"	1,100	121
VC2-902	640	(2) 20	(2) 5	146,200	54,260	34,830	12,370	172 3/4"	42 1/2"	1,100	121
VC2-942	668	(2) 20	(2) 5	142,800	58,020	38,900	14,400	182"	51 3/4"	1,350	144
VC2-982	696	(2) 25	(2) 5	153,900	58,060	38,940	14,400	182"	51 3/4"	1,350	144
VC2-1026	728	(2) 30	(2) 5	163,500	58,100	38,980	14,400	182"	51 3/4"	1,350	144
VC2-1082	767	(2) 30	(2) 5	160,230	61,020	41,740	15,780	182"	51 3/4"	1,510	160
VC2-1160	823	(2) 40	(2) 5	176,340	61,400	42,120	15,780	182"	51 3/4"	1,510	160
VC2-1170	830	(2) 30	(2) 5	154,080	67,645	45,905	15,780	194 1/4"	61"	1,715	186
VC2-1252	888	(2) 40	(2) 5	170,400	67,755	46,015	15,780	194 1/4"	61"	1,715	186
VC2-1052	746	(2) 10 & (2) 5	(2) 5	179,400	73,170	44,420	15,170	163 1/2"	33 1/4"	1,330	146
VC2-1162	824	(2) 15 & (2) 7 1/2	(2) 5	205,300	73,390	44,640	15,170	163 1/2"	33 1/4"	1,330	146
VC2-1246	884	(2) 20 & (2) 10	(2) 5	226,000	73,430	44,680	15,170	163 1/2"	33 1/4"	1,330	146
VC2-1284	911	(2) 15 & (2) 7 1/2	(2) 5	199,200	80,290	50,880	18,290	172 3/4"	42 1/2"	1,650	181
VC2-1376	976	(2) 20 & (2) 10	(2) 5	219,300	80,330	50,920	18,290	172 3/4"	42 1/2"	1,650	181
VC2-1422	1,009	(2) 20 & (2) 10	(2) 5	214,300	87,210	57,140	21,400	182"	51 3/4"	1,980	216
VC2-1504	1,067	(2) 25 & (2) 15	(2) 5	230,800	87,410	57,340	21,400	182"	51 3/4"	1,980	216
VC2-1570	1,113	(2) 30 & (2) 15	(2) 5	245,300	87,450	57,380	21,400	182"	51 3/4"	1,980	216
VC2-1654	1,173	(2) 30 & (2) 15	(2) 5	240,400	91,840	61,540	23,480	182"	51 3/4"	2,210	241
VC2-1774	1,258	(2) 40 & (2) 20	(2) 5	264,600	92,240	61,940	23,480	182"	51 3/4"	2,210	241
VC2-1790	1,269	(2) 30 & (2) 15	(2) 7.5	230,000	99,790	67,000	27,160	194 1/4"	61"	2,580	280
VC2-1914	1,357	(2) 40 & (2) 20	(2) 7.5	252,160	100,010	67,220	27,160	194 1/4"	61"	2,580	280

Notes:

1. Model number denotes nominal tons using R-22 at a 105ºF condensing temperature, a 40ºF suction temperature, and a 78ºF wet-bulb temperature.
2. R-717 tons are at a 96.3ºF condensing temperature, a 20ºF suction temperature, and a 78ºF wet-bulb temperature.
3. Operating weight shown is based on total unit weight, weight of refrigerant operating charge, and cold water basin filled to the overflow level.
4. The coil section is the heaviest section.
5. Standard refrigerant connection size is 4” BFW (inlet and outlet).
6. Refrigerant charge listed is R-717 operating charge. To determine operating charge for R-22, multiply charge by 1.93. For R-134a, multiply by 1.98.

VCL Engineering Data

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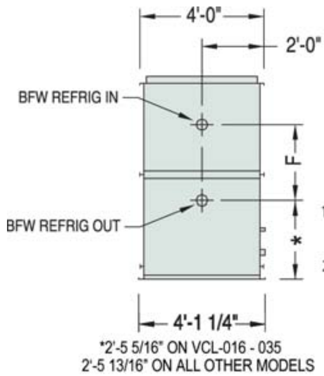
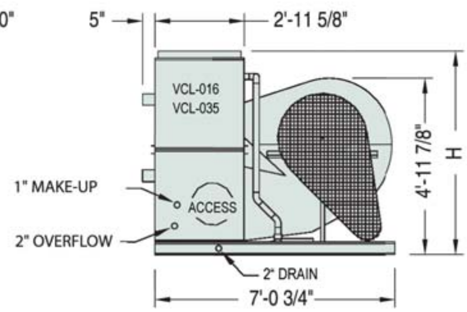
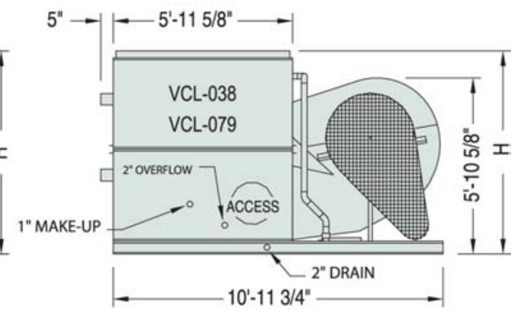
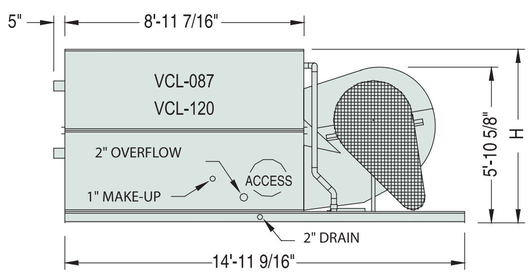
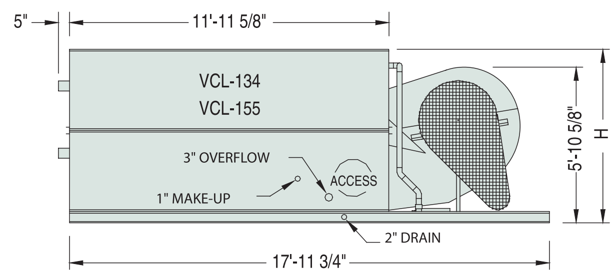
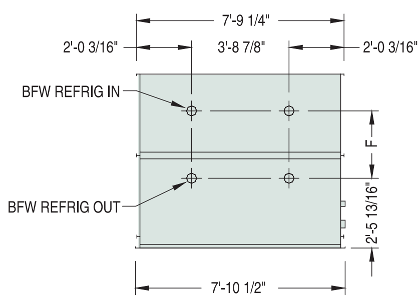


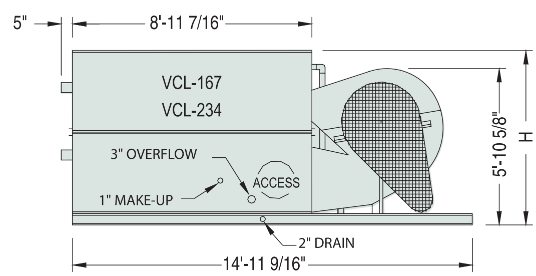


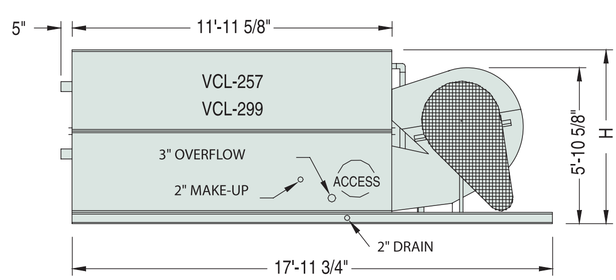












See page F58
for Engineering
Considerations.

MODEL NUMBER[1]	R-717 TONS[2]	MOTOR HP		AIRFLOW (CFM)	WEIGHT (LBS)		DIMENSIONS		R-717 OPERATING CHARGE[7] (LBS)	INTERNAL COIL VOLUME (FT^3)
		FAN[3]	PUMP		OPERATING[4]	SHIPPING	H	F		
VCL-016	11	1	1/3	7,040	2,210	1,660	62 1/4"	14 1/4"	23	2.5
VCL-019	13	2	1/3	8,310	2,240	1,690	65"	14 1/4"	23	2.5
VCL-024	17	2	1/3	8,010	2,470	1,900	75 3/4"	22 3/4"	34	3.3
VCL-029	21	2	1/3	7,660	2,700	2,120	82"	31 1/4"	44	4.3
VCL-035	25	3	1/3	8,140	2,960	2,360	90 1/2"	39 3/4"	52	5.2
VCL-038	27	3	1/2	12,800	3,530	2,400	62 1/4"	13 1/4"	44	4.4
VCL-044	31	2	1/2	12,620	3,940	2,760	73"	21 3/4"	62	6.3
VCL-048	34	3	1/2	14,250	3,970	2,790	73"	42 1/2"	62	6.3
VCL-054	38	5	1/2	16,150	3,990	2,810	75 3/4"	21 3/4"	62	6.3
VCL-058	41	3	1/2	13,570	4,370	3,180	79 1/4"	30 1/4"	83	8.2
VCL-065	46	5	1/2	15,600	4,390	3,200	79 1/4"	30 1/4"	83	8.2
VCL-073	52	5	1/2	15,150	4,820	3,610	87 3/4"	38 3/4"	101	10
VCL-079	56	7 1/2	1/2	16,690	4,890	3,680	90 1/2"	38 3/4"	101	10
VCL-087	62	5	1	19,280	6,130	4,380	82 1/4"	33 1/4"	122	12
VCL-096	68	7 1/2	1	21,570	6,160	4,410	82 1/4"	33 1/4"	122	12
VCL-102	72	10	1	23,730	6,190	4,440	82 1/4"	33 1/4"	122	12
VCL-108	77	7 1/2	1	21,200	6,770	4,990	92 9/16"	42 1/2"	159	15
VCL-115	82	10	1	22,970	6,800	5,020	92 9/16"	42 1/2"	159	15
VCL-120	85	10	1	22,210	7,440	5,620	100 3/4"	51 3/4"	182	18
VCL-134	95	10	1 1/2	25,130	8,590	6,160	92 9/16"	42 1/2"	203	20
VCL-148	105	15	1 1/2	28,400	8,650	6,220	92 9/16"	42 1/2"	203	20
VCL-155	110	15	1 1/2	28,000	9,450	6,950	100 3/4"	51 3/4"	242	24
VCL-167	118	10	1 1/2	36,870	11,570	8,030	82 1/4"	33 1/4"	244	24
VCL-185	131	15	1 1/2	41,560	11,630	8,090	82 1/4"	33 1/4"	244	24
VCL-209	148	15	1 1/2	40,780	12,870	9,270	92 9/16"	42 1/2"	317	30
VCL-223	158	20	1 1/2	44,290	12,880	9,280	92 9/16"	42 1/2"	317	30
VCL-234	166	20	1 1/2	43,480	14,140	10,460	100 3/4"	51 3/4"	364	35
VCL-257	182	20	2	47,860	16,000	11,080	92 9/16"	42 1/2"	406	40
VCL-271	192	20	2	47,370	17,540	12,480	100 3/4"	51 3/4"	484	47
VCL-286	203	25	2	50,670	17,580	12,520	100 3/4"	51 3/4"	484	47
VCL-299	212	30	2	53,520	17,620	12,560	100 3/4"	51 3/4"	484	47

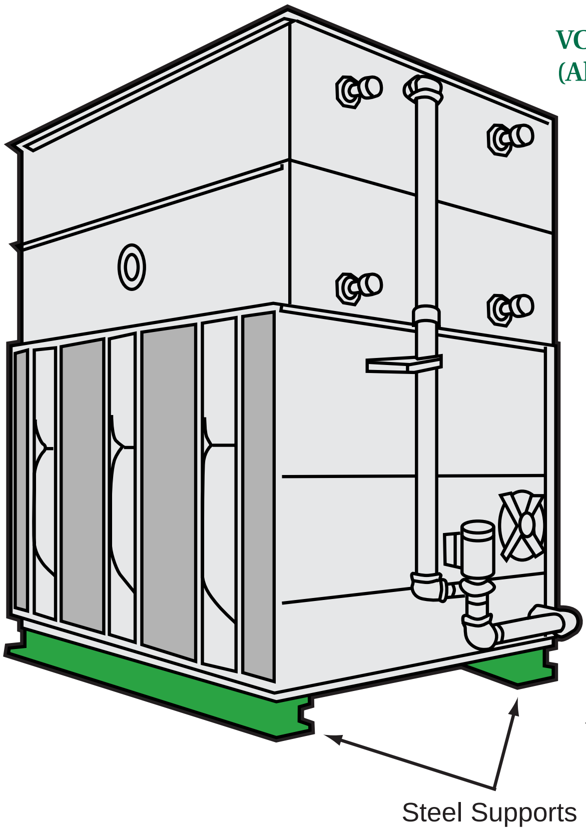
Notes:

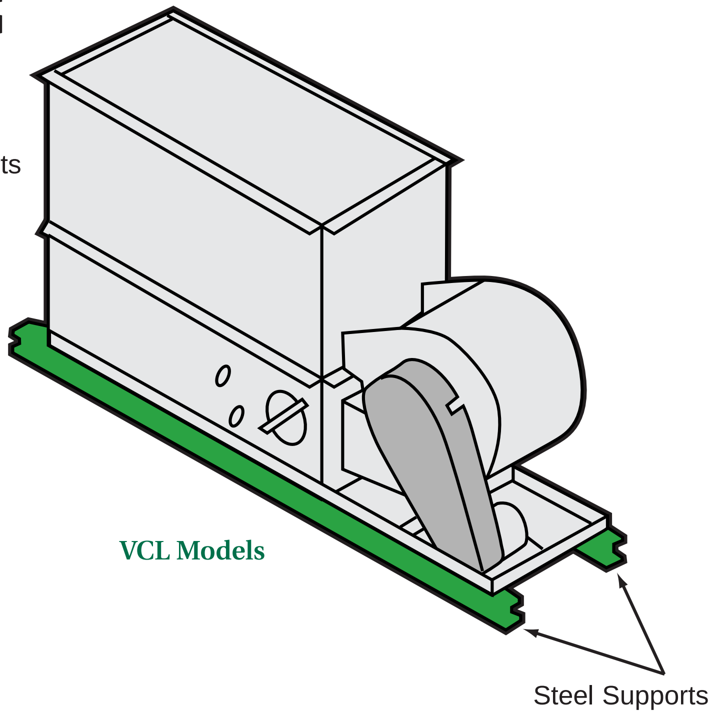
1. Model number denotes nominal tons using R-22 at a 105ºF condensing temperature, a 40ºF suction temperature, and a 78ºF wet-bulb temperature.
2. R-717 tons are at a 96.3ºF condensing temperature, a 20ºF suction temperature, and a 78ºF wet-bulb temperature.
3. Fan horsepower is at 0” external static pressure.
4. Operating weight shown is based on total unit weight, weight of refrigerant operating charge, and cold water basin filled to the overflow level.
5. All models ship in one piece.
6. Standard refrigerant connection sizes are 3-inch BFW inlet and outlet for VCL-016 through -035, and 4” BFW inlet and outlet for all other models.
7. Refrigerant charge listed is R-717 operating charge. To determine operating charge for R-22, multiply charge by 1.93. For R-134a, multiply by 1.98.

Structural Support

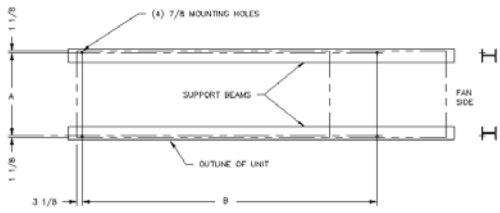
The recommended support arrangement for the Series V Evaporative Condenser consists of parallel I-beams running the full length of the unit, spaced as shown in the following drawings. Besides providing adequate support, the steel also serves to raise the unit above any solid foundation to ensure access to the bottom of the unit. To support a Series V Evaporative Condenser in an alternate steel support arrangement, consult your BAC Representative.

VC1 Models
(Also representative of VC2 models)

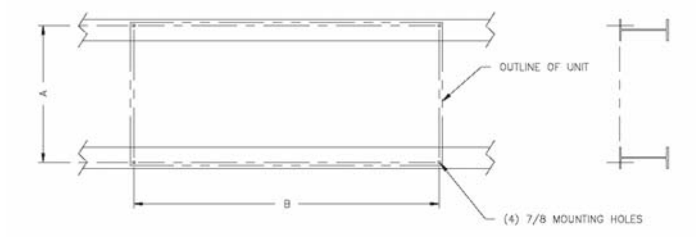




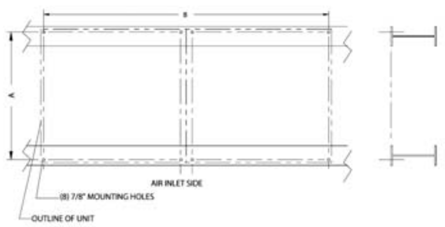
VCL Models



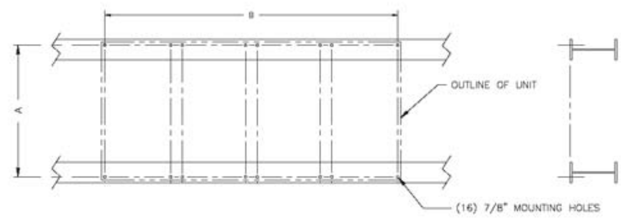
All VCL Models



VC1-10 thru -516, -N208 thru -N315,
& -C216 thru -C320
VC2-319 thru -626 & -N138 thru -N301



VC1-540 thru -1032, -N338 thru -N470,
& -C339 thru -C469
VC2-526 thru -1252 & -N356 thru -N1204



VC1-1158 thru -1608 & VC2-1052 thru -1914

MODEL NUMBER	A	B	MAXIMUM DELFECTION[3]
VC1-10 thru 25	3' 9-3/8"	2' 5-1/2"	3/32"
VC1-30 thru 65	3' 9-3/8"	5' 5-1/2"	3/16"
VC1-72 thru 90	3' 9-3/8"	8' 5-1/4"	5/16"
VC1-100 thru 135	3' 9-3/8"	11' 5-1/2"	3/8"
VC1-150 thru 205	4' 6-1/4"	11' 5-1/2"	3/8"
VC1-N208 thru N315	7' 7-5/8"	10' 7-1/2"	3/8"
VC1-N338 thru N470	7' 7-5/8"	16' 7-3/4"	1/2"
VC1-386 thru 516	11' 7-1/4"	10' 7-1/2"	3/8"
VC1-540 thru 804	11' 7-1/4"	16' 7-3/4"	1/2"
VC1-772 thru 1032	11' 7-1/4"	22' 8-1/4"	1/2"
VC1-1158 thru 1608	11' 7-1/4"	34' 8-3/4"	1/2"
VC1-C216 thru C320	7' 1-5/8"	10' 7-1/2"	3/8"
VC1-C339 thru C469	7' 1-5/8"	16' 7-3/4"	1/2"
VC2-N138 thru N191	4' 9-1/2"	11' 5"	3/8"
VC2-N206 thru N235	6' 4-1/4"	10' 7-1/2"	3/8"
VC2-N261 thru N301	7' 8"	10' 7-1/2"	3/8"
VC2-N356 thru N446	7' 8"	16' 7-3/4"	1/2"
VC2-319 thru 626	11' 7-1/4"	10' 7-1/2"	3/8"
VC2-526 thru 957	11' 7-1/4"	16' 7-3/4"	1/2"
VC2-N870 thru N1204	11' 7-1/4"	22' 8-1/4"	1/2"
VC2-684 thru 1252	11' 7-1/4"	22' 8-1/4"	1/2"
VC2-1052 thru 1914	11' 7-1/4"	34' 8-3/4"	1/2"
VCL-016 thru -035	3' 11"	4' 6"	1/4"
VCL-038 thru -079	3' 11"	7' 11-1/2"	3/8"
VCL-087 thru -120	3' 11"	10' 11-1/4"	1/2"
VCL-134 thru -155	3' 11"	13' 11-1/2"	1/2"
VCL-167 thru -234	7' 8-1/4"	10' 11-1/4"	1/2"
VCL-257 thru -299	7' 8-1/4"	13' 11-1/2"	1/2"

Notes:

1. Support beams and anchor bolts are to be selected and installed by others.
2. All supporting steel must be level at the top.
3. Beams must be selected in accordance with accepted structural practice. The maximum allowable deflection of the beams under the unit shall be as specified in the table above.
4. All units can be furnished with an optional vibration isolation package, if required, to be installed between the unit and supporting steel. When determining the length of steel beams, allow for the length of vibration isolation rails, as they may be longer than the unit length shown above.
5. If point vibration isolation is used, the isolators must be located under the supporting steel, not between the support steel and the unit.

Engineering Specifications

See our website at www.BaltimoreAircoil.com for an electronic copy of product engineering specifications.

Part 1: General

A. General: Furnish and install, _____ factory assembled evaporative condenser(s) of counterflow blow-through design, with single side entry, conforming in all aspects to the specifications and schedule as shown on the plans.

B. Capacity: The evaporative condenser(s) shall be warranted by the manufacturer to have condensing capacity of _____ BTUH heat rejection, operating with ____ refrigerant and ___ºF condensing temperature and ___ºF entering wet-bulb temperature.

C. Warranty: The manufacturer's standard equipment warranty shall be for a period of one year from the date of startup or eighteen months from the date of shipment, whichever ends first. The manufacturer shall, in addition, provide a 5-year mechanical drive warranty covering the fans, fan shafts, bearings, sheaves, supports, and fan motors.

D. Factory Testing: Equipment manufacturer shall be capable of testing the operation of the condenser in the manufacturer's own test facility. Test facilities shall be capable of simulating design conditions, including but not limited to design wet-bulb, airflow, refrigerant mass flow rate, refrigerant condensing temperature, and total heat rejection.

E. Quality Assurance: The manufacture shall have Management System certified by an accredited registrar as complying with the requirements of ISO-9001 to ensure consistent quality of products and services. Manufacturers that are not ISO-9001 certified shall provide an additional one-year warranty to the customer at no additional cost.

Part 2: Products

2.01 Evaporative Condenser Materials and Components

A. General: All steel panels and structural elements shall be constructed from heavy-gauge, G-235 (Z700 metric) hot-dip galvanized steel, with cut edges given a protective coating of zinc-rich compound.

2.02 Coil Casing Assembly

A. The evaporative condenser shall include a coil casing section consisting of a refrigerant condensing coil, a spray water distribution system, and drift eliminators as indicated by the manufacturer.

1. The refrigerant condensing coil shall be fabricated of all prime surface steel at the manufacturer's own facility, and hot-dip galvanized after fabrication.

- **a.** The refrigerant condensing coil shall be tested at 375 psig (2687 kPa) air pressure under water.
- **b.** The refrigerant condensing coil shall be designed for low pressure drop with sloping tubes for free drainage of liquid refrigerant.
- **c.** The refrigerant condensing coil shall be ASME B31.5 compliant and coils shipping into Canada shall be supplied with a CRN.

2. Water shall be distributed evenly over the coil at a minimum flow rate of 4.5 gpm/ft2 (3.1 lps/m2) to ensure complete wetting of the coil at all times by large-diameter, non-clog, 360° plastic distribution nozzles spaced across the coil face area in Schedule 40 PVC spray branches. Nozzles shall utilize a two-stage diffusion pattern to provide overlapping, umbrella spray patterns that create multiple intersection points with adjacent nozzles.

- **a.** Directional nozzles shall not be acceptable.
- **b.** Spray branches and nozzles shall be held in place by snap-in rubber grommets, allowing quick removal of individual nozzles or complete branches for cleaning or flushing.
- **c.** Nozzles shall have a minimum of 0.25" (6.35 mm) protrusion inside the spray branches to ensure unimpeded water flow between regular cleanings of the water distribution system.

3. Removable PVC drift eliminators shall be positioned to prevent moisture from leaving the evaporative condenser and incorporate a minimum of three (3) changes in air direction.

2.03 Pan Assembly

A. The evaporative condenser shall include a pan assembly consisting of cold water basin with pump assembly and fan assemblies with single side air inlet and integral air plenum.

1. The cold water basin shall include: a drain/clean-out connection; a steel strainer; a brass make-up valve; overflow connection; and a water recirculation pump assembly.

- **a.** Drain/cleanout connection shall be located in the cold water basin to allow removal of recirculating water.
- **b.** Lift-out steel strainer shall be supplied with perforated openings sized smaller than the water distribution nozzle orifices and an integral anti-vortexing hood to prevent air entrainment.
- **c.** Brass make-up valve shall be supplied with a large-diameter plastic float arranged for easy adjustment.
- **d.** Overflow connection shall be provided in the cold water basin to protect against recirculating water spillage.
- **e.** Water recirculation pump shall be a close-coupled, bronze-fitted centrifugal pump equipped with a mechanical seal, mounted on the basin and piped from the suction strainer to the water distribution system.
  - **i.** The pump shall be installed so that it may drain freely when the basin is drained.
  - **ii.** The pump assembly shall include an integral metering valve and bleed line to control the bleed rate from the pump discharge to the overflow connection.
  - **iii.** The pump motor shall be totally enclosed fan cooled (TEFC) type suitable for _____ V, ____ phase______ Hz electrical service.

f. On installations requiring a remote sump, the evaporative condenser shall be modified to accommodate the use of an independent sump and pump for recirculating water (by others)

i. The recirculating water pump, steel strainer, make-up valve, and integral bleed line assemblies shall be omitted from the evaporative condenser scope of supply.

ii. The evaporative condenser shall be supplied with a cold water basin outlet sized and located as indicated on the drawings for gravity drain to the remote sump.

iii. The water distribution system shall have an operating pressure of 2 psig (115 kPa) at the evaporative condenser spray water inlet connection.

VC2 Models

2. Air shall enter the evaporative condenser through the axial fan assemblies and integral air plenum.

a. Fans and motors shall be located in the dry entering airstream to provide greater reliability and ease of maintenance.

b. Fan motors and drives shall be located at the front base of the unit to facilitate access without requiring access to the inside of the unit.

c. Fan cylinders shall have curved inlets for efficient air entry.

d. Each fan 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.

e. Fans shall be heavy-duty, axial flow type with aluminum alloy blades driven by a one-piece, multi-groove neoprene/polyester belt designed for a minimum of 150% of the motor nameplate horsepower.

i. Fan shafts shall be mounted in heavy-duty, self-aligning, grease-packed relubricatable ball bearings with eccentric locking collars, designed for a minimum L10 life of 40,000 hours.

ii. Bearing lubrication lines shall be extended to the exterior of the unit.

iii. Fan and motor sheaves shall be fabricated from corrosion-resistant materials.

f. Fan motor(s) shall be totally enclosed fan cooled (TEFC) type with a 1.15 service factor, suitable for _____ V, ____ phase, ______ Hz electrical service and shall be mounted on an easily adjusted, heavy-duty motor base.

Special moisture protection shall be provided on the windings, shafts and bearings.

g. Integral air plenum shall contain additional guide vanes to ensure uniform airflow into the coil casing section.

VC1 Models

2. Air shall enter the evaporative condenser through the centrifugal fan assemblies and integral air plenum.

a. Fans and motors shall be located in the dry entering airstream to provide greater reliability and ease of maintenance.

b. Fan housings shall have curved inlet rings for efficient air entry and rectangular discharge cowls that extend into the pan to increase fan efficiency and prevent water from entering the fans.

c. Fan housings on units more than 8' wide shall be split to facilitate the removal of the fan shaft.

d. Fan(s) shall be heavy-duty, centrifugal flow type mounted on a steel shaft with heavy-duty, self-aligning, relubricatable bearings with cast iron housings, designed for a minimum L10 life of 40,000 hours.

e. Fan motor(s) shall be totally enclosed fan cooled (TEFC) type with a 1.15 service factor, suitable for _____ V, ____ phase, ______ Hz electrical service and shall be mounted on an easily adjusted, heavy-duty motor base. Special moisture protection shall be furnished on the windings, shafts, and bearings.

VCL Models

2. Air shall enter the evaporative condenser through the centrifugal fan assemblies and integral air plenum.

a. Centrifugal fan assemblies shall be located adjacent to the casing and the cold water basin to minimize overall unit height.

b. Fan housings shall have curved inlet rings for efficient air entry and rectangular discharge cowls which extend into the pan to increase fan efficiency and prevent water from entering the fans.

c. Fan housings shall be split to facilitate the removal of the fan shaft.

d. Fan(s) shall be heavy-duty, centrifugal flow type mounted on a steel shaft with heavy-duty, self-aligning, relubricatable bearings with cast iron housings, designed for a minimum L10 life of 40,000 hours.

e. Fan motor(s) shall be totally enclosed fan cooled (TEFC) type with a 1.15 service factor, suitable for _____ V, ____ phase, ______ Hz electrical service and shall be mounted on an easily adjusted, heavy-duty motor base.

Special moisture protection shall be provided on the windings, shafts and bearings.

2.04 Optional Equipment Specifications

A. Evaporative condenser shall be provided with basin heaters to prevent freezing of the water in the cold water basin when the evaporative condenser is idle.

1. The basin heaters shall be selected to maintain +40° F (4.4° C) basin water temperature at a 0° F (-17.8° C) ambient temperature and 10 mph (16.1 km/hr) wind speed.

2. Basin heaters shall be electric immersion type controlled by a remote thermostat with the sensing bulb located in the basin water.

3. Basin heaters shall be provided with a factory-installed low water level cutout switch to prevent heater operation unless the heater elements are fully submerged.

B. Evaporative condenser shall be supplied with dedicated motors and drives so that each fan can be cycled independently, and an internal baffle shall be supplied to deter air bypass within the unit.

C. Evaporative condenser shall be provided with a factory assembled, field-installed external platform with an access ladder and handrails complying with OSHA standards and regulations to provide access to the top of the evaporative condenser.

1. External platform shall have a 24" (610 mm) wide non-skid walking surface and 42" (1220 mm) high safety railings.

2. Optional ladder/safety cage shall be available to meet OSHA requirements as necessary.

D. Evaporative condenser shall be supplied with the ENERGY-MISER® Fan System to improve part load efficiency and provide system redundancy in case of a motor failure.

1. The ENERGY-MISER® Fan System shall include the main fan motor as listed in the manufacturer's published literature and a pony motor sized for approximately 1/3 of design horsepower and 2/3 of design fan speed to optimize energy savings during non-design load conditions.

Engineering Considerations - Evaporative Condensers

Location

Units must have an adequate supply of fresh air to the air inlet(s). When units are located adjacent to building walls or in enclosures, care must be taken to ensure that the warm, saturated discharge air is not deflected off of surrounding walls or enclosures and drawn back to the air inlet(s).

CAUTION:

Each unit should be located and positioned to prevent the introduction of the warm discharge air and the associated drift, which may contain chemical or biological contaminants including *Legionella*, into the ventilation systems of the building on which the unit is located or those of adjacent buildings.

For detailed recommendations on layout, refer to our web site, www.BaltimoreAircoil.com, or consult your local BAC Representative.

For Series V products, bottom screens or solid bottom panels may be desirable or necessary for safety, depending on the location and conditions at the installation site.

Piping and Valves

Piping should be adequately sized according to standard refrigeration practice and arranged to allow flexibility for expansion and contraction between component parts of the system. Suitably sized equalizing lines must be installed between the condenser and high pressure receiver to prevent gas binding and refrigerant backup in the condenser. Service valves should be installed so that the component parts may be easily serviced.

On multiple evaporative condenser installations, evaporative condensers in parallel with shell-and-tube condensers, or single condensers with multiple coils, refrigerant outlet connections must be trapped into the main liquid refrigerant header. The height of the trapped liquid legs must be sufficient to balance the effect of the unequal coil pressures without backing up liquid refrigerant into the condensing coil. This type of liquid line piping permits independent operation of any one of the parallel circuits without manually closing inlet and outlet valves.

Although equalizing lines can be used to balance water levels between multi-cell evaporative condensers, the spray water for each cell must be treated separately, and a separate make-up must be provided for each cell. Note that a common remote sump for multi-cell installations can simplify make-up and water treatment see page J16 for details. See page F60 or the appropriate Operating and Maintenance Instruction Manual for more information on water treatment

Capacity Control

Variable Frequency Drives (VFD)

Installations which are to be controlled by Variable Frequency Drives (VFD) require the use of an inverter duty motor as designed per NEMA Standard MG.1, Section IV, Part 31, which recognizes the increased stresses placed on motors by these drive systems. Inverter duty motors must be furnished on VFD applications in order to maintain the motor warranty.

WARNING:

When the fan speed is to be changed from the factory-set speed, including through the use of a variable speed control device, steps must be taken to avoid operating at or near fan speeds that cause a resonance with the unit or its supporting structure. At start-up, the variable frequency drive should be cycled slowly between zero and full speed and any speeds that cause a noticeable resonance in the unit should be "locked out" by the variable speed drive.

Fan Cycling

Fan cycling is the simplest method of capacity control. The number of steps of capacity control can be increased using the ENERGY-MISER® Fan System, the independent fan motor option, or two-speed fan motors in conjunction with fan cycling (see the "Custom Features & Options" section of the appropriate product line to determine whether the ENERGY-MISER® Fan System or the independent fan motor option are available; two-speed motors are available for all products). These options provide substantial energy savings when compared to simple fan cycling.

WARNING:

Rapid on-off cycling can cause the fan motor to overheat. It is recommended that controls be set to allow a maximum of 6 on-off cycles per hour.

Note: Spray water pump cycling should not be used for capacity control. This method of control often results in short cycling of the pump motor as capacity changes substantially with pump cycling. In addition, alternate wetting and drying of the coil promotes scaling of the heat exchanger coil surface.

Capacity Control Dampers (Centrifugal Fans Models Only)

On centrifugal fan models, modulating capacity control dampers are available to provide close control of head pressure. See page F19 or contact your local BAC Representative for more details.

Vibration Cutout Switches

Vibration cutout switches are recommended on all installations. Vibration cutout switches are designed to interrupt power to the fan motor and/or provide an alarm to the operator in the event of excessive vibration. BAC offers both electronic and mechanical vibration cutout switches on all evaporative condenser models.

Water Treatment

As water evaporates in an evaporative cooling unit, the dissolved solids originally present in the water remain in the system. The concentration of these dissolved solids increases rapidly and can cause scale and corrosion. In addition, airborne impurities and biological contaminants, including *Legionella*, may be introduced into the circulating water. To control all potential contaminants, a water treatment program must be employed. In many cases, a simple bleed-off may be adequate for control of scale and corrosion. *Note: Bleed lines are to be provided and installed by others.* However, biological contamination, including *Legionella*, can be controlled only through the use of biocides. Such treatment should be initiated at system startup, after periods of equipment shutdown, and continued regularly thereafter. Accordingly, it is strongly recommended a biocide treatment be initiated when the unit is first filled with water and continued regularly thereafter. For more information, consult the appropriate Operating and Maintenance Manual.

When a water treatment program is employed, it must be compatible with construction materials. The pH of the circulating water must be maintained between 6.5 and 9.0. Units having galvanized steel construction and a circulating water pH of 8.3 or higher will require periodic passivation of the galvanized steel to prevent the accumulation of white, waxy, nonprotective zinc corrosion called white rust. Batch feeding of chemicals into the unit is not recommended. If units are constructed with optional corrosion resistant materials, acid treatment may be considered; however, the water quality must be maintained within the guidelines set forth in the Operating and Maintenance Instructions.

Note: Unless a common remote sump is utilized, each cell of a multi-cell installation must be treated as a separate entity, even if the cold water basins are flumed together or equalized.

For complete Water Quality Guidelines, see the appropriate Operating and Maintenance Instruction Manual, available at www.BaltimoreAircoil.com

For specific recommendations on water treatment, contact a competent water treatment supplier.

Sound Levels

Sound rating data is available for all BAC Evaporative Condensers. When calculating the sound levels generated by a unit, the designer must take into account the effects of the geometry of the tower as well as the distance and direction from the unit to noise-sensitive areas. Low-sound fans and intake and discharge sound attenuation can be supplied on certain models to provide reduced sound characteristics (see the "Custom Features and Options" section of the appropriate product line for details). The ENERGY-MISER® Fan System, two-speed motors, or variable frequency drives can also be used to reduce sound during periods of non-peak thermal loads. For more information on sound and how it relates to evaporative cooling equipment, see page J20. For detailed low sound selections, please consult your local BAC Representative.

Protection Against Basin Water Freezing

When a unit is shut down in freezing weather, the basin water must be protected by draining to an indoor auxiliary remote sump tank (see page H5 for remote sump engineering data; page J16 for sizing guidelines) or by providing supplementary heat to the cold water basin. Supplementary heat can be provided by electric immersion heaters or in some cases, hot water or steam coils, or steam injectors. All exposed water piping, make-up lines, and spray pumps (if applicable) that do not drain at shutdown should be traced with electric heater tape and insulated.

When dry operation is planned for low ambient conditions, centrifugal fan units should be supplied with oversized fan motors to prevent motor overload when the spray water is not operating. Dry operation with standard fan motors is acceptable for axial fan units. For remote sump applications, the spray water pump must be selected for the required flow at a total head which includes the vertical lift, pipe friction (in supply and suction lines) plus the required pressure at the inlet header of the water distribution system (2.0 psi for CXV models; 1.0 psi for Series V models). A valve should always be installed in the discharge line from the pump to permit adjusting flow to the unit requirement. Inlet water pressure should be measured by a pressure gauge installed in the water supply riser at the spray water inlet, and adjusted to the specified inlet pressure. See page J17 for more information.

Indoor Installations (Applicable to Series V Models Only)

Many indoor installations require the use of inlet and/or discharge ductwork. **Units installed with inlet ductwork must be ordered with solid-bottom panels**. Generally, intake ducts are used only on smaller units while the equipment room is used as a plenum for larger units. Discharge ductwork will normally be required to carry the saturated discharge air from the building.

Both intake and discharge ductwork must have access doors to allow servicing of the fan assembly, drift eliminators, and water distribution system. All ductwork should be symmetrical and designed to provide even air distribution across the face of air intakes and discharge openings.

WARNING:

The discharge opening must be positioned to prevent the introduction of discharge air into the fresh air intakes serving the unit or the ventilation systems of adjacent buildings.

Note: Axial fan units are not suitable for indoor installations.

Safety

Adequate precautions, appropriate for the installation and location of these products, should be taken to safeguard the public from possible injury and the equipment and the premises from damage. Operation, maintenance and repair of this equipment should be undertaken only by personnel qualified to do so. Proper care, procedures and tools must be used in handling, lifting, installing, operating, maintaining, and repairing this equipment to prevent personal injury and/or property damage.

Code Requirement

Standard coils are ASME B31.5 compliant and are provided with a Canadian Registration Number (CRN) when required. State or local codes, or certain applications may require the use of pressure vessels designed, fabricated, tested and “U” stamped in accordance with the ASME Boiler and Pressure Vessel Code, Section VIII, Division I. In such cases, the optional ASME “U” Stamp coil must be provided.

Purging

Air and other non-condensable gases collect in refrigeration systems from several sources: poor evacuation prior to charging or after repairs; a leak into the system if pressures are below atmospheric; and chemical breakdown of oil and/or refrigerant. If permitted to accumulate, non-condensables in the system cause high condensing pressures and, therefore, increased power input to the compressors. Purging can be accomplished during shut down, from the high point of the system, or during operation, from the top of the condensing coil outlet and high pressure receiver.

Refer to the *BAC Evaporative Condenser Engineering Manual* for more detailed recommendations on piping and purging.

Refrigerant Liquid Subcooling

The pressure at the expansion device feeding the evaporator(s) can be substantially lower than the receiver pressure due to liquid line pressure losses. If the liquid line is long or the evaporator is above the receiver, which further reduces the pressure at the expansion device, significant flashing can occur in the liquid line.

To avoid liquid line flashing where the above conditions exist, it is necessary to subcool the liquid refrigerant after it leaves the receiver. The minimum amount of subcooling required is the temperature difference between the condensing temperature and the saturation temperature corresponding to the pressure at the expansion device. To determine the degree of subcooling required, it is necessary to calculate the liquid line pressure drop including valves, ells, tees, strainers, etc., and add to it the pressure drop equivalent to the static head loss between the receiver and the expansion device at the evaporator, if the evaporator is located above the receiver.

Some compressor manufacturers publish their compressor ratings based on a fixed amount of subcooling at the expansion device. Subcooled liquid at the expansion device of the evaporator does increase system capacity since it increases the refrigeration effect per pound of refrigerant circulated. But the increase is relatively small and seldom justifies the cost of the subcooling device and piping for this reason alone. However, where compressor ratings based on subcooled liquid are used, the specified amount of subcooling must be added to that required for liquid line pressure drop and static head loss.

One method commonly used for supplying subcooled liquid for halocarbon systems is to provide a subcooling coil section in the evaporative condenser, located below the condensing coil (see Figure 1). ***Note: This option is available on Series V Evaporative Condensers Only.*** Depending upon the design wet-bulb temperature, condensing temperature, and subcooling coil surface, these sections will normally furnish 10°F to 15°F (5.6°C to 8.3°C) of liquid cooling. However, to be effective, the subcooling coil must be piped between the receiver and evaporator as shown in Figure 1.

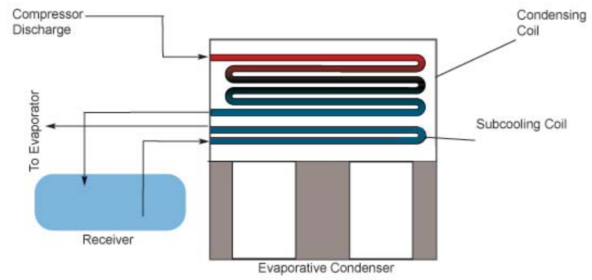


Figure 1

Note: Increasing the evaporative condenser size over the capacity required for the system will not produce liquid subcooling. The increased condenser capacity will result only in lower operating condensing temperatures. The same result will occur if the condensing coil is piped directly to the subcooling coil.

Low temperature, multistage ammonia (R-717) refrigeration systems often use liquid subcooling between stages for more economical operation. However, subcooling coils in an evaporative condenser are seldom, if ever, used with an ammonia refrigeration system for several reasons:

1. Design condensing temperatures are generally lower with ammonia, thus limiting the amount of subcooling that can be obtained.
2. The density of ammonia liquid is approximately 37 pounds per cubic foot, less than half that of the normally used halocarbons, and static head losses are proportionately less.
3. The expansion devices and system designs normally used for ammonia systems are less sensitive to small amounts of flash gas.
4. The high latent heat of ammonia (approximately 480 Btu/lb versus 70 Btu/lb for R-22) results in comparatively small amounts of flash gas with a liquid line properly sized for low pressure drop.

Warranties

Please refer to the Limitation of Warranties applicable to and in effect at the time of the sale/purchase of these products.