



# Series V Evaporative Condenser

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**The VC1, VCL, and VC1-C combine to complete BAC's Series V product line.**

Together, they provide solutions to some of the most difficult evaporative cooling scenarios. With both indoor and outdoor applications possible the VCL also accommodates low height restrictions. The VC1-C is ideal for exporting, as it fits into standard shipping containers.



# BAC's Series V: Confidence & Reliability

7 to 1,140 R-717 Tons in a Single Unit

Low Sound  
by Design

Indoor &  
Outdoor  
Installations;  
Easily Hidden

Split Coils  
for Multiple  
Compressors

Export  
Units

Single Piece  
Shipping &  
Rigging



# Series V Benefits

## > Easy Maintenance

- ▶ BAC 360™ Spray Nozzles are non-clogging, reducing maintenance costs, and ensuring efficient equipment operation
- ▶ Fans, motors, and drive system are located outside of the moist discharge air stream, protecting them from moisture, condensation, and icing while facilitating maintenance
- ▶ All moving parts are located near the base of the unit, within easy reach for cleaning, lubrication, or adjustments

## > Flexible Installation

- ▶ Low profile VCL fits well into mechanical equipment rooms with low ceilings and are easily hidden behind louvered walls on buildings
- ▶ Series V models have centrifugal fans, suitable for applications where external duct work and other sources of external static pressure exist
- ▶ VC1, VCL, and VC1-C can accommodate indoor applications

## > Economical Export

- ▶ VC1-C models are sized specifically to fit into standard dry van containers, minimizing ocean freight costs for export shipments



BAC 360 Spray Nozzles



Moving Parts Located Near Base of Unit



VC1-C Models Are Sized for Export



## > Redundancy and Reliability

- ▶ Premium efficient/inverter duty motors are standard
- ▶ BALTIGUARD™ Fan System provides redundancy and energy savings by providing a pony motor (option)

## > Low Sound

- ▶ Centrifugal fans have inherently low sound characteristics
- ▶ Factory designed sound attenuation is available for both the air intake and discharge
- ▶ Particularly sound sensitive areas can be accommodated by facing the blankoff panel to the sound sensitive direction

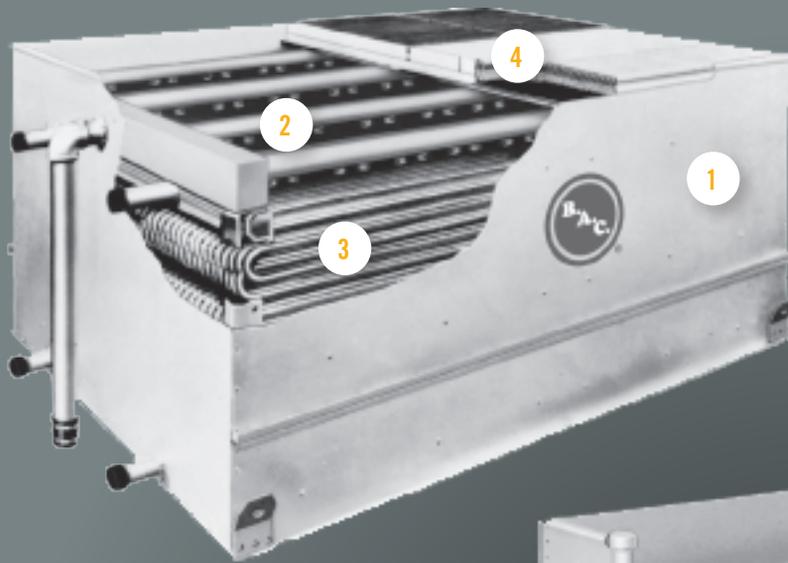


Centrifugal Fans with Inherently Low Sound Characteristics

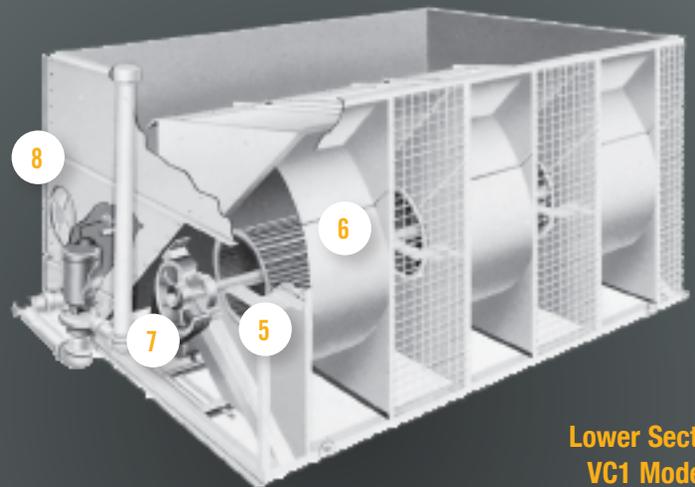


Sound Attenuation

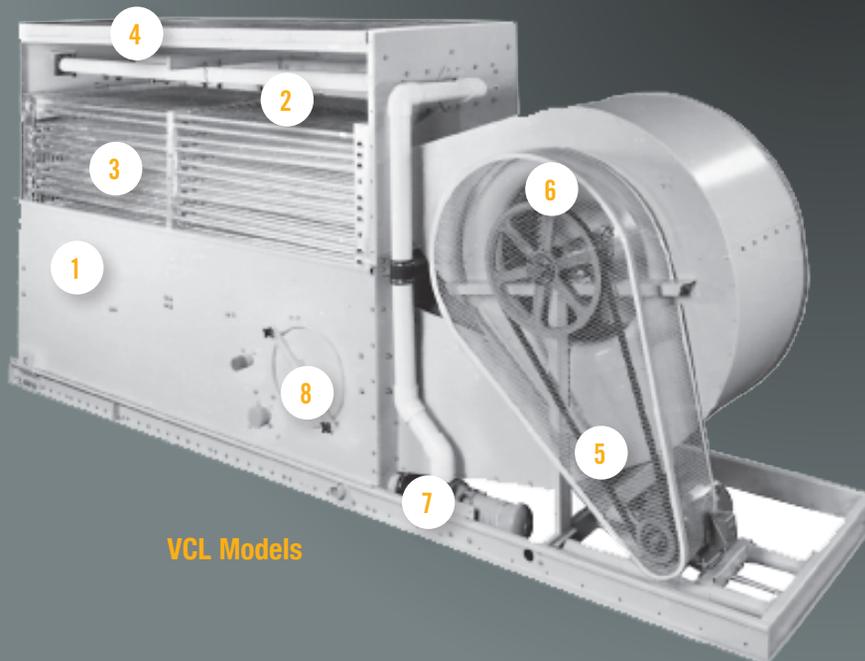
# Series V Construction Details



Upper Section:  
VC1 Models



Lower Section:  
VC1 Models



VCL Models

## 1 Heavy-Duty Construction

- ▶ G-235 (Z700 metric) mill galvanized steel panels

## 2 Water Distribution System

- ▶ Schedule 40 PVC spray branches
- ▶ Large orifice, 360 Spray Nozzles are non-clog
- ▶ Nozzles are grommeted for easy maintenance

## 3 Coil

- ▶ Continuous serpentine, steel tubing
- ▶ Hot-dip galvanized after fabrication (HDGAF)
- ▶ Maximum allowable working pressure is 300 psig (2,068 kPa)
- ▶ Sloped tubes for free drainage of fluid
- ▶ Fabricated per ASME B31.5 standards
- ▶ Orders shipping into Canada are supplied with a CRN

## 4 Drift Eliminators

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

## 5 Fan Drive System

- ▶ V-belt
- ▶ Heavy duty bearings, with minimum  $L_{10}$  40,000 hours
- ▶ Premium efficient/VFD duty fan motors are standard
- ▶ 5-year motor and drive warranty

## 6 Low Sound Centrifugal Fan(s)

- ▶ Quiet operation
- ▶ Overcome static pressure

## 7 Recirculating External 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 Doors

- ▶ Interior of unit is easily accessible

## 9 Strainer (NOT SHOWN)

- ▶ Anti-vortexing design to prevent air entrainment

# Series V

## Custom Features & Options

### > Materials of Construction

Determining the appropriate material of construction for a project depends on several factors, including water quality, climate and environmental conditions, availability of time and manpower for maintenance, unit lifetime requirements, and budget. BAC provides the widest variety of material of construction options in the industry and has the ability to provide a solution to meet all conditions and budgets.

#### ▶ STANDARD CONSTRUCTION

G-235 mill galvanized steel is the heaviest commercially available galvanized steel, universally recognized for its strength and corrosion resistance. To assure long life, G-235 mill galvanized steel is used as the standard material of construction for all units. All exposed cut edges are protected with a thick, zinc coating after fabrication to ensure the zinc rich corrosion barrier is maintained for all over protection.

#### ▶ THERMOSETTING HYBRID POLYMER (OPTION)

A thermosetting hybrid polymer, used to extend equipment life, is applied to select G-235 mill galvanized steel components of the unit. The polymerized coating is baked onto the G-235 mill galvanized steel and creates a barrier to the already corrosion resistant galvanized steel. The thermosetting hybrid polymer has been tested to withstand 6,000 hours in a 5% salt spray without blistering, chipping, or losing adhesion.

#### ▶ STAINLESS STEEL (OPTION)

For applications where the most severe corrosive conditions exist or where long equipment life is required, several material of construction options utilizing stainless steel are available.

- **WATER CONTACT STAINLESS STEEL BASIN**  
The basin components below the overflow level are constructed of stainless steel.
- **WATER CONTACT STAINLESS STEEL UNIT**  
The basin and water-contacted components below the overflow level in the basin are constructed of stainless steel. All principal steel components in the casing section will be constructed of galvanized steel as standard.
- **ALL STAINLESS STEEL CONSTRUCTION**  
Steel panels and structural elements are constructed of stainless steel. *Available on VC1 and VC1-C units.*



Standard VCL Construction Installation



**NOTE:** With proper maintenance and water treatment, G-235 galvanized steel products will provide an excellent service life under the operating conditions normally encountered in refrigeration and industrial applications.



Stainless Steel Basin



## > Coil Configuration

BAC offers a large selection of coil configuration options to fulfill any thermal and pressure drop requirements.

### ▶ **STANDARD SERPENTINE COIL**

The standard cooling coil is constructed of continuous lengths of all prime surface steel. The coil is hot-dip galvanized after fabrication (HDGAF) to apply a thick, zinc corrosion barrier over the entire exterior surface of the coil. The coil is designed for low pressure drop with sloping tubes for free drainage of fluid. Each coil has a maximum allowable working pressure of 300 psig (2,068 kPa) and is fabricated per ASME B31.5 standards to ensure the highest quality and integrity.

### ▶ **STAINLESS STEEL COIL (OPTION)**

Coils are available in stainless steel for specialized applications. The coil is designed for low pressure drop with sloping tubes for free drainage of fluid. Each coil has a maximum allowable working pressure of 300 psig (2,068 kPa) and is fabricated per ASME B31.5 standards to ensure the highest quality and integrity.

### ▶ **ASME U DESIGNATOR COIL (OPTION)**

BAC offers coils that are certified in accordance with the ASME Boiler and Pressure Vessel Code, Section VIII, Division I. ASME U designated coils are available for projects requiring ASME certified pressure vessels and involve 3rd party inspection and certification. Standard ASME U designated coils are rated at 340 psig (2,344 kPa) maximum allowable working pressure, and they are pneumatically tested at 375 psig (2,586 kPa).

### ▶ **EXTENDED SURFACE (FINNED) COIL (OPTION)**

Coils are available with up to all rows finned at 5 fins per inch for seasonal wet/dry operation. The fins increase the surface area of the coil, therefore increasing the condensing capability. The coil is hot-dip galvanized after fabrication (HDGAF) to apply a thick, zinc corrosion barrier over the entire exterior surface of the coil and fins. BAC coils are designed for low pressure drops and to be completely drainable with sloping tubes for free drainage of fluid. Each coil has a maximum allowable working pressure of 300 psig (2,068 kPa) and is fabricated per ASME B31.5 standards to ensure the highest quality and integrity.



Standard Serpentine Coil



Stainless Steel Coil



Extended Surface Coil

# Series V

## Custom Features & Options

### ▶ **MULTIPLE CIRCUIT COILS/AUXILIARY COOLING CIRCUIT (OPTION)**

Split coil configurations are available to allow separate process fluid (or refrigerant) loops through the same unit. Separate loops may be needed for multiple applications requiring different temperature processes or multiple types of process fluids (or refrigerants). Multiple refrigerant circuit coils are generally required on halocarbon refrigerant systems, where it is common practice to maintain individual compressor systems. The quantity of circuits, capacity per circuit, and desired connection size and type should be specified when requesting this option.

### ▶ **DESUPERHEATER COILS (OPTION)**

The addition of a desuperheater coil can sometimes 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. Coils are hot-dip galvanized after fabrication and have a maximum allowable working pressure of at 300 psig (2,068 kPa). Piping between the desuperheater coil and the condenser coil is not included.

### ▶ **SUBCOOLING COILS (OPTION)**

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 (5.6°C) of subcooling at standard conditions. Subcooling sections are approximately 7" high and are mounted between the coil and basin sections. Coils are hot-dip galvanized after fabrication and have a maximum allowable working pressure of 300 psig (2,068 kPa).

### ▶ **COPPER SWEAT FITTINGS (OPTION)**

Factory installed copper sweat fittings are available to simplify field piping.



Multiple Circuit Coil Connections



Copper Sweat Fitting



**NOTE:** A Canadian Registration number (CRN) is required for all pressure vessels over 15 psig entering Canada. The CRN identifies that the design of a boiler, or fitting has been accepted and registered for use in Canada. CRN is available for all standard coil configurations shipping into Canada.



## › Drive System Options

The fan drive system provides the cooling air necessary to reject unwanted heat from the system to the atmosphere. All BAC drive systems use premium efficient cooling tower duty motors and include BAC's comprehensive 5-year motor and drive warranty. Cooling tower duty motors are specially designed for the harsh environment inside a condenser and have permanently lubricated bearings, drastically decreasing the maintenance requirement of the motor. BAC belt drive systems are the most durable and maintenance friendly drive systems on the market, including single nut adjustment for belt tensioning to make belt tensioning simple.



### ▶ EXTERNAL V-BELT DRIVE

This BAC engineered external drive consists of centrifugal fan(s), motor(s), and drive system(s) located outside of the moist discharge airstream, protecting them from moisture, condensation and icing. The drive system consists of a specially designed belts, taper lock sheaves, and premium efficient cooling tower duty motor to provide maximum performance.



External V-Belt Drive



### BALTIGUARD™ FAN SYSTEM (OPTION)

The BALTIGUARD™ Fan System 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 for approximately 2/3 speed and consumes only 1/3 the design horsepower. This configuration allows 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 (pony), even on a design wet-bulb day. Controls and wiring are the same as those required for a two-speed, two-winding motor. Redundant motors are available by increasing the size of the standby fan motor of the BALTIGUARD™ Fan System to the size of the main motor, providing 100% motor redundancy (Applicability dependant on motor size and model. Contact your local BAC Representative for more information).

### ▶ BALTIGUARD PLUS™ FAN SYSTEM (OPTION)

The BALTIGUARD PLUS™ Fan System builds on the advantages of the BALTIGUARD™ Fan System by adding a VFD to either the pony or the main motor, depending on system requirements. This offers the benefits of additional capacity control and energy savings, along with the redundancy offered by the BALTIGUARD™ Fan System. Alternatively, a VFD can be added to BOTH the pony and main motor, for complete capacity control and redundancy under any load.



BALTIGUARD™ Fan System

# Series V

## Custom Features & Options

### ▶ VIBRATION CUTOUT SWITCH (OPTION)

A factory mounted vibration cutout switch is available to effectively protect against rotating equipment failure. 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 on either switch type to activate an alarm. Remote reset capability is also available on either switch type.

### ▶ EXTENDED LUBRICATION LINES (OPTION)

Extended lubrication lines are available for lubrication of the fan shaft bearings. Fittings are located on the exterior casing panel next to the access door.

## > Basin

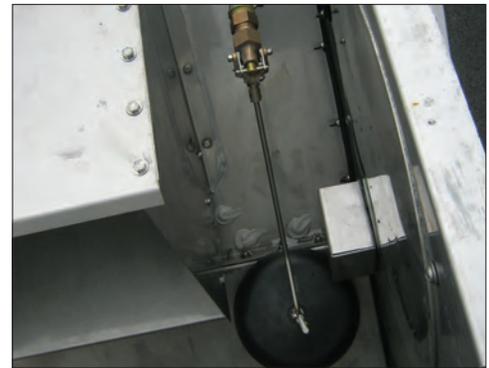
The spray water collects in the basin which is pumped back over the condensing coil. The Series V basin includes the “V” sloped basin design. During operation, this design eliminates any stagnant water zones, which are susceptible to biological growth.

### ▶ STANDARD MECHANICAL WATER LEVEL CONTROL

Mechanical make-up valves must operate continuously in the moist and turbulent environment within evaporative cooling equipment. Due to this environment, the operation of the valve must be simple and the valve must be durable. BAC's high quality mechanical water level control assembly is standard with all units and has been specially designed to provide the most reliable operation while being easy to maintain. This accessory is omitted for remote sump applications.

### ▶ ELECTRIC WATER LEVEL CONTROL (OPTION)

BAC's Electric Water Level Control (EWLC) is a state-of-the-art, conductivity actuated, probe type liquid level control. The hermetically sealed EWLC is engineered and manufactured specifically for use in evaporative cooling systems and is equipped with an error code LED to indicate status, including when the water and/or probes are dirty. The EWLC option replaces the standard mechanical make-up valve and includes a slow closing, solenoid activated valve in the make-up water line to minimize water hammer. EWLC is recommended when more precise water level control is required and in areas that experience sub-freezing conditions.



Mechanical Water Level Control Inspection



Electric Water Level Control



### BASIN SWEEPER PIPING (OPTION)

Basin sweeper piping is an effective method of reducing sediment that may collect in the basin. A complete piping system, including nozzles, is provided in the basin to connect to side stream filtration equipment (provided by others). For more information on filtration systems, consult “Filtration Guide” found on **page J241**.

### ▶ LOW AND HIGH LEVEL ALARM FLOAT SWITCHES (OPTION)

Low and high level alarm float switches are available to provide added control to your equipment operation. Level alarms can alert operators to an abnormal operating condition to ensure the highest system efficiency with minimal water usage.

### ▶ BASIN HEATERS (OPTION)

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



Basin Heater

## HEATER kW DATA

Model Number	0°F (-17.8°C) Ambient Heaters		-20°F (-28.9°C) Ambient Heaters	
	Number of Heaters	kW per Heater	Number of Heaters	kW per Heater
VC1-10 to VC1-25	1	2	1	2
VC1-30 to VC1-65	1	2	1	2
VC1-72 to VC1-90	1	2	1	3
VC1-100 to VC1-135	1	3	1	5
VC1-150 to VC1-205	1	3	1	5
VC1-N208 to VCA-N230	1	5	1	7.5
VC1-N243 to VC1-N315	1	5	1	7.5
VC1-C216 to VC1-C230	1	5	1	7.5
VC1-N338 to VC1-N470	1	7	1	10
VC1-C339 to VC1-C469	1	5	1	7.5
VC1-386 to VC1-516	1	8	1	10
VC1-540 to VC1-804	1	12	1	16
VC1-772 to VC1-1032	2	8	2	10
VCL-016 to VCL-035	1	2	1	2
VCL-038 to VCL-079	1	3	1	4
VCL-087 to VCL-120	1	4	1	5
VCL-134 to VCL-155	1	5	1	7
VCL-167 to VCL-234	1	7	1	9
VCL-257 to VCL-299	1	9	1	12



**NOTE:** This table is based on 460V/3 phase/60 Hz power.

# Series V

## Custom Features & Options

### > Water Distribution System

#### ▶ STANDARD SPRAY WATER PUMP

The Series V water distribution system comes standard with an integral spray water pump sized to distribute the recirculating water over the coil maximizing capacity. The patented BAC 360 non-clog nozzles ensure even flow over the coil area and are simple to remove for maintenance. Parallel flow of air and spray water to allow for inspection and access to the top of the coils during full operation.



Spray Water Pump



#### REDUNDANT PUMPS (OPTION)

An optional secondary spray pump is available for critical applications.

### > Shipping and Rigging

BAC units are factory-assembled to ensure uniform quality with minimal field assembly. Each unit has been designed with rigging and assembly in mind and includes features to minimize the number of tools required and installation time.

All low profile VCL Evaporative Condensers ship completely assembled, minimizing installation time and cost. There are no motors to mount, no sheaves to align, no belts to install, and no make-up system to assemble.

#### ▶ KNOCKDOWN UNITS (OPTION)

Knockdown units are available for jobs where access to the condenser location is limited by elevators, doorways, or similar obstacles, where lifting methods impose very strict weight limits, or where the shipping cost of a fully assembled unit is excessive. All materials of construction and design features are the same as those of a factory assembled unit.



Non-clog Nozzles Ensure Even Flow Over Coil Area



## > Sound Options

The low sound levels generated by Series V Evaporative Condensers make them suitable for most installations. The panel opposite the air intake, called the blankoff panel, is inherently quiet. Positioning the blankoff panel towards the sound sensitive direction insulates sensitive areas from higher sound levels.

### ▶ STANDARD FAN

The standard centrifugal fan provided on Series V Evaporative Condensers is inherently quiet and is selected to optimize low sound levels.

### ▶ SOUND ATTENUATION (OPTION)

For extremely sound sensitive installations, factory designed, tested, and rated sound attenuation options are available for both the air intake and discharge. Consult your local BAC Representative regarding available options.

### ▶ SINGLE-SIDE AIR INTAKE

Single-side air intake units can be placed close to solid walls, reducing the size of enclosures and allowing for more profitable use of premium space. Also, the panel opposite the air intake, called the blankoff panel, is inherently quiet. Positioning the blankoff panel towards the sound sensitive direction insulates sensitive areas from higher sound levels.



Standard Centrifugal Fan



Intake and Discharge Sound Attenuation

## > Air Discharge Options

BAC offers a full line of standard discharge hoods that are built, tested, and rated specifically for all Series V Evaporative Condensers.

### ▶ DISCHARGE HOODS (OPTION)

BAC offers a full line of standard discharge hoods with and without positive closure dampers that are built, tested, and rated specifically for all Series V Evaporative Condensers. The tapered hoods are designed to increase the discharge air velocity to avoid recirculation in extremely tight enclosures. Straight or tapered hoods can be used to elevate the unit discharge above adjacent walls. A larger fan motor may be necessary when this option is provided.



Discharge Hoods

# Series V

## Custom Features & Options

### > Air Intake Options

In an evaporative condenser, airborne debris can be entrained in the water through the unit's air intake. The Series V has several options for air intake accessories that prevent debris from entering the system and maintain even unobstructed flow through the unit. Reducing the amount of debris that enters the condenser lowers maintenance requirements and helps to maintain thermal efficiency.

#### ▶ AIR INTAKE SCREENS

Standard 1" x 1" wire mesh screen is factory-installed over the air intake to prevent debris from entering the unit.

#### ▶ BOTTOM INTAKE SCREENS (OPTION)

Series V Evaporative Condensers are available with factory-installed wire mesh screens over the bottom openings to prevent unauthorized access.

#### ▶ SOLID BOTTOM PANELS (OPTION)

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



Air Intake Screens

### > Access Options

BAC's evaporative equipment is designed to be easily maintained for sustaining capacity over a longer life. All access options are OSHA compliant to ensure personnel safety and code compliance.

#### ▶ HANDRAIL PACKAGES AND LADDERS (OPTION)

Handrail packages and ladders are available to provide safe access to the top of the unit for maintenance to the distribution system.



Handrails Packages and Ladders



**NOTE:** Access options can be added at the time of order or as an aftermarket item.