



# Closed Circuit Cooling Towers

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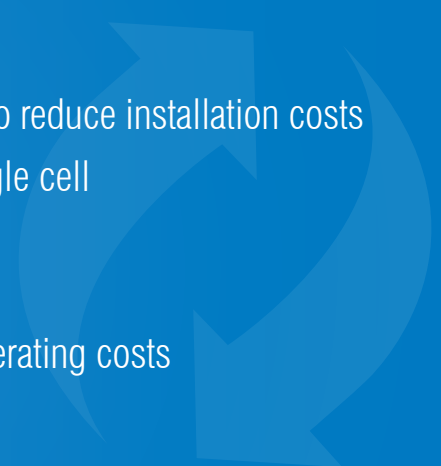
**BAC** offers the broadest range of closed circuit cooling towers to meet your needs. With more than 75 years of experience designing and manufacturing closed circuit cooling towers, BAC has the expertise to meet any application.

### **WHY BAC?...**

- ✓ Over 75 years of industry leading experience
- ✓ Largest variety of footprints and air intake configurations to reduce installation costs
- ✓ Capacities ranging from 3.9 to 624 nominal tons in a single cell

### **THE ONLY STOP FOR...**

- ✓ Highest efficiency units on the market to lower annual operating costs
- ✓ Reliable units that meet the needs of critical applications
- ✓ Hybrid systems for water conservation
- ✓ Material of construction options to meet every application and budget



# Advantages of Closed Circuit

Closed circuit cooling towers are used in the following applications: water source heat pumps, industrial processes, air compressors, weld machine cooling, mold water cooling, power plant auxiliary cooling, furnace cooling, transformer cooling, closed condenser loops, critical systems, and systems requiring plume elimination.

## LOWEST OPERATING COST:

- ✓ Clean process fluids sustain the performance of high efficiency components
- ✓ Save on energy consumption by operating in “Free Cooling Mode” during the winter

## LOWEST MAINTENANCE COSTS:

- ✓ Reduces or eliminates cleaning the heat exchanger
- ✓ Extends the life of the equipment

## OPERATIONAL FLEXIBILITY:

- ✓ Free cooling without an intermediate heat exchanger
- ✓ Dry operation during winter months
- ✓ Variable speed pumping to conserve energy without the potential of scaling the unit

## LOWEST WATER COSTS:

- ✓ Lower volume of recirculating water reduce water treatment cost
- ✓ Dry operation and adiabatic modes reduce or eliminate water consumption

## MINIMAL INSTALLATION COSTS:

- ✓ Compact single piece of equipment conserves space replaces three components (cooling tower, heat exchanger, and pump arrangement)



Chemical Processing



Data Centers

# The BAC Advantage



**BAC's** Closed Circuit Cooling Towers offer highly efficient cooling solutions, by completely isolating the process cooling fluid from the atmosphere. Isolating the process cooling fluid prevents airborne contaminants from entering the system, protecting the quality of the fluid and reducing system maintenance due to fouling. Reduced fouling ensures full thermal performance throughout the life of the product, and minimizes system operating costs.

## OPTIMIZED PERFORMANCE:

- ✓ Technologies that maximize performance per HP used
- ✓ CTI Certified thermal performance with water and glycol ensuring thermal performance has been verified independently

## FLEXIBLE CONFIGURATION:

- ✓ Broad range of products to meet your specific application needs based on:
  - Footprint
  - Process Fluid Pressure Drop
  - Fan and Pump Horsepower
  - Applications

## ALL APPLICATIONS:

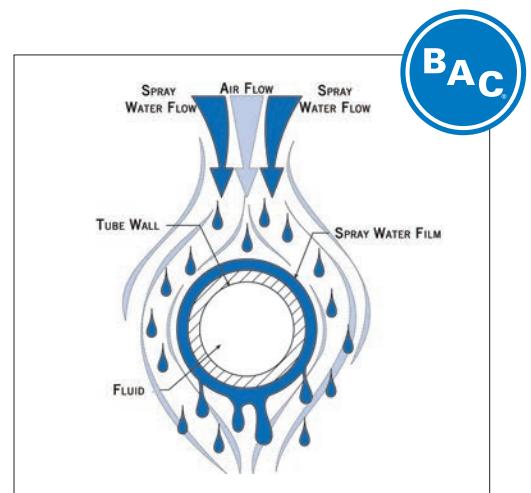
- ✓ CTI Certified
- ✓ All units meet or exceed ASHRAE Standard 90.1 energy efficient requirements
- ✓ Coils are welded to ASME B31.5 standards, ensuring reliable and safe operation

## CRITICAL APPLICATIONS:

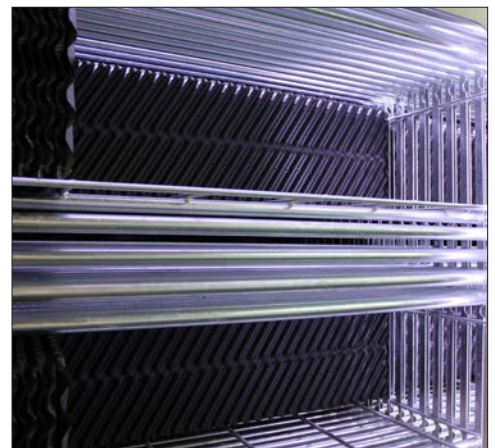
- ✓ Independent fans and motors add steps of capacity control (Optional)
- ✓ Redundant pumps provide a back up in the event of an unexpected failure (optional)
- ✓ All units are designed and tested in accordance with wind and seismic requirements of the 2012 International Building Code and ASCE-SEI-2010
- ✓ Dry Operating Mode

## PROCESS APPLICATIONS:

- ✓ Alternative process fluids can satisfy unique applications.
- ✓ ASME "U" Stamp (optional)



Advanced Coil Technology



OptiCoil™ System

# Which Solution is Right for You?

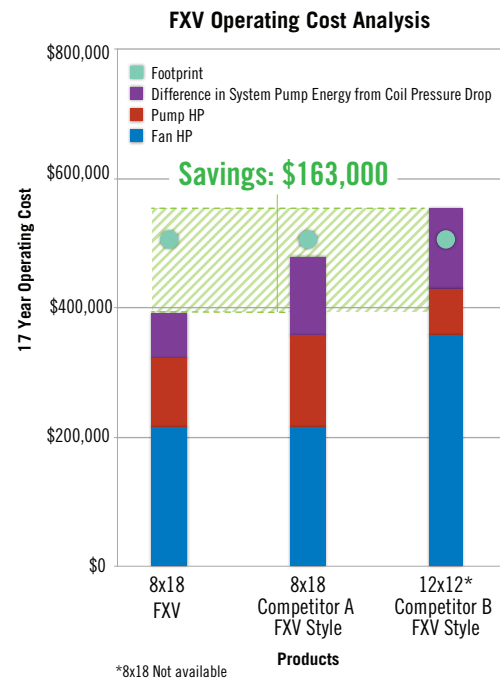
## > THE FXV (Page 8)

### The Lowest Total Cost of Ownership

- ✓ Lowest installed cost
- ✓ Lowest weight, glycol charges, and footprint
- ✓ Best accessibility to plenum and spray distribution to minimize maintenance costs
- ✓ Lowest operating costs over the life of the equipment as shown in the FXV Operating Cost Analysis graph
- ✓ For larger applications, the FXV Dual Air Intake unit provides all the benefits of the FXV with greater capacity

#### NOTES FOR GRAPH:

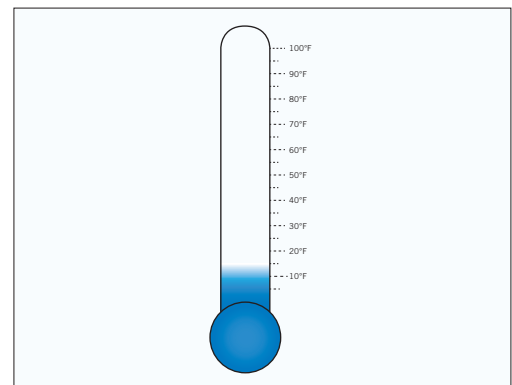
1. Selection based on cooling 650 USGPM of water 95°F to 85°F at 78°F entering wet bulb temperature
2. Process Application
3. Energy Prices: \$0.12kWh and \$18 demand charge



## > THE PFI (Page 12)

### Dry Operation for Severe Cold Weather

- ✓ Dry operation in harsh winter climates
- ✓ Patent-pending SmartSpray™ Technology reduces pump energy costs up to 60% which results in up to \$30,000 in savings
- ✓ The perfect replacement unit for existing installations
- ✓ CTI Certified with water and glycol
- ✓ OptiCoil™ System providing the the ultimate heat transfer combination



■ May benefit from dry operation during severe winter conditions depending on the application



## > **SERIES V** (Page 14) **Indoor Installations or Height Restricted Applications**

- ✓ Indoor/Outdoor Flexibility
- ✓ Handles external static pressure for indoor installations
- ✓ Low profile units are ideal for height sensitive installations



Series V Installation with height requirements

## > **THE HXV** (Page 16) **The Water Conservation Solution**




- ✓ This hybrid closed circuit cooling tower uses evaporative adiabatic and dry operation mode for optimized water and energy conservation, while maintaining thermal performance
  - **Combined Wet/Dry Mode** - Offers the highest efficiency with the lowest water consumption
  - **Adiabatic Mode** - Reduced water usage at mild ambient conditions
  - **Dry Operation Mode** - Operates dry for water savings up to 70% over traditional fluid coolers during extremely cold weather
- ✓ Eliminates plume during dry operation



HXV Hybrid Closed Circuit Cooling Tower



# Unique Features

## CLOSED CIRCUIT COOLING TOWERS

	FXV	FXV DUAL AIR INTAKE	PFI
Model			
Flow and Fan System	Induced Draft Combined Flow, Axial Fan	Induced Draft, Combined Flow, Axial Fan	Induced Draft, Counterflow, Axial Fan
Single Cell Capacity Range	29 - 424 Nominal Tons* 87 - 1,272 USGPM at 95°F to 85°F at a 78°F	344 - 624 Nominal Tons* 1,032 - 1,872 USGPM at 95°F to 85°F at a 78°F	18 - 360 Nominal Tons* 54 - 1,080 USGPM at 95°F to 85°F at a 78°F
UNIQUE FEATURES	<ul style="list-style-type: none"> <li>Advanced Coil Technology minimizes scaling and fouling potential</li> <li>Combined Flow Technology increases cooling capability</li> <li>Large access doors for easy maintenance access</li> <li>Single-point wiring for motors and vibration cutout switch</li> <li>Independent Fan and redundant pump options</li> <li>Pre-assembled platform packages</li> <li>Shake table tested up to <math>S_{DS}</math> of 2.4g</li> </ul>	<ul style="list-style-type: none"> <li>Advanced Coil Technology minimizes scaling and fouling potential</li> <li>Combined Flow Technology increases cooling capability</li> <li>Ideal for large tonnage applications</li> <li>Highest single cell capacity</li> </ul>	<ul style="list-style-type: none"> <li>Ideal competitor replacement unit</li> <li>Patent-pending OptiSpray™ Technology lowers operating costs</li> <li>OptiCoil™ System</li> <li>Dry operation mode for severe weather operating conditions</li> <li>Independent Fan and redundant pump options</li> <li>Shake table tested up to <math>S_{DS}</math> of 3.75g</li> <li>Single-piece rigging</li> </ul>

\* Nominal tons are 3 USGPM/ton of water at 95°F to 85°F at a 78°F EWB



VF1	VFL	HXV HYBRID TOWER	
			Model
<p>Forced Draft, Counterflow, Centrifugal Fan</p>	<p>Forced Draft, Counterflow, Centrifugal Fan</p>	<p>Induced Draft, Combined Flow, Axial Fan</p>	Flow and Fan System
<p>4.1 - 543 Nominal Tons* 12.3 - 1,629 USGPM at 95°F to 85°F at a 78°F</p>	<p>3.9 - 108 Nominal Tons* 11.7 - 324 USGPM at 95°F to 85°F at a 78°F</p>	<p>160 - 305 Nominal Tons* 480 - 915 USGPM at 95°F to 85°F at a 78°F</p>	Single Cell Capacity Range
<ul style="list-style-type: none"> <li>Centrifugal fan for indoor and ducted installations</li> <li>Moderate dry operation for systems that benefit from dry operation</li> <li>Optional finned coils to enhance dry operation mode</li> </ul>	<ul style="list-style-type: none"> <li>Low profile to meet low height requirements</li> <li>Centrifugal fan for indoor and ducted installations</li> <li>Moderate dry operation mode for systems that benefit from dry operation</li> <li>Optional finned coils to enhance dry operation mode</li> <li>Single-piece rigging</li> </ul>	<ul style="list-style-type: none"> <li>Hybrid technology - using sensible, adiabatic, and evaporative heat transfer - for water conservation up to 70% over conventional evaporative products</li> <li>Maximum dry operation for systems that benefit from dry operation</li> <li>Suitable for high temperature process fluids greater than 180°F</li> </ul>	UNIQUE FEATURES

\* Nominal tons are 3 USGPM/ton of water at 95°F to 85°F at a 78°F EWB

# FXV

BAC's FXV Closed Circuit Cooling Tower product offers more flexibility and provides custom solutions based on footprint, horsepower, pressure drop, and price. Utilizing Advanced Coil Technology and Combined Flow Technology, BAC provides the most energy efficient closed circuit cooling tower on the market and one that provides as much as 33% more capacity than before. In addition, the FXV has been shake table tested, with proven performance after a seismic event.



**Lowest Operating Costs**  
Savings up to \$30,000



**Lowest Installation Costs**



**Crossflow Design**  
Easiest to Maintain



FXV Closed Circuit Cooling Tower

## LOW ENVIRONMENTAL IMPACT

- ✓ Energy Efficient
  - Capacity is certified by the Cooling Technology Institute using water, ethylene glycol, and propylene glycol
  - All units meet or exceed ASHRAE Standard 90.1 energy efficiency requirements
  - Advanced Coil Technology reduces evaporation directly off the coil and minimizes the potential for scaling and fouling, maintaining capacity
  - Premium efficient/inverter duty fan motors are standard
  - Independent fan operation (optional)
- ✓ Sound Reduction Options
  - Standard fan is low sound and high efficiency
  - For further reduced sound levels, Low Sound Fans, Whisper Quiet Fans, and sound attenuation are available (optional)
  - Particularly sound sensitive installations can be accommodated by facing the quiet blank-off panel to the sound sensitive direction



**Note:** The TriArmor® Corrosion Protection System and EVERTOUGH™ Construction are two unique materials of construction available on the new FXV.



FXV with Intake Sound Attenuation

## RELIABLE YEAR-ROUND OPERATION

- ✓ BALTDRIIVE® Power Train fan system
  - No minimum fan speed is required
- ✓ Cooling tower duty motors designed for hostile environments

## LOW INSTALLATION COSTS

- ✓ Reduced weight simplifies rigging and reduces support steel costs
- ✓ Factory pre-assembled platforms allow quick in-field assembly (optional)
- ✓ Modular design reduces assembly time
- ✓ Three piece lifts for reduced helicopter lift costs
- ✓ Fewer coil connections reduce piping costs
- ✓ Single point wiring for the motors and vibration cut out switches eliminates running internal wire and provides one accessible tie-in point (optional)
- ✓ Designed to mount directly on existing steel support



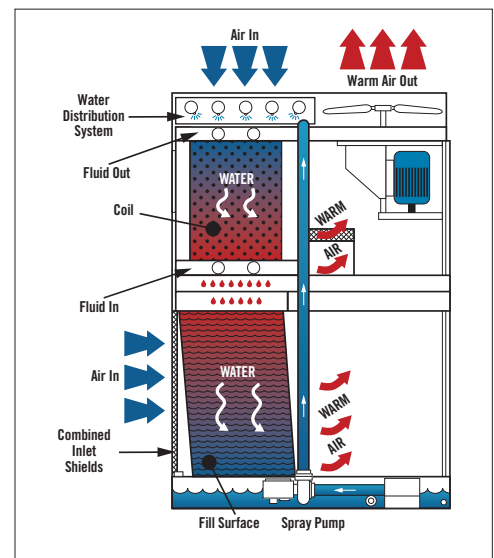
Combined Inlet Shields

## DURABLE CONSTRUCTION

- ✓ Meets wind and seismic requirements of the 2009 International Building Code (IBC)
- ✓ Unique materials of construction options

## EASY MAINTENANCE

- ✓ Crossflow configuration provides direct access for easy maintenance to the cold water basin, spray distribution system, and drive system
- ✓ Spray distribution system is easy to inspect while the unit is operating
- ✓ Hinged access doors and standard internal walkway provide easy access to the unit's cold water basin, drift eliminators, fan drive system, and heat transfer coil
- ✓ Combined inlet shields smooth airflow for optimal thermal performance and block sunlight in locations susceptible to algae growth
- ✓ Motor removal system facilitates motor replacement (optional)
- ✓ Fill surface is elevated to facilitate flushing of the dirt and debris from critical areas



FXV Principle of Operation



# FXV Dual Air Intake

The FXV Dual Air Intake models provide many of the same features and benefits of the FXV, but on a much larger scale. It is the largest closed circuit cooling tower on the market, making it ideal for large projects where size matters.



**Ideal for Large Projects**



**Crossflow Design  
Easiest to Maintain**



**Easy Installation**



**Multi-cell FXV Dual Air Intake Installation**



**Note:** The FXV Dual Air Intake has the largest single cell capacity in the industry with 624 nominal tons.

## LOW ENVIRONMENTAL IMPACT

- ✓ Energy Efficient
  - Capacity is certified by the Cooling Technology Institute using water, ethylene glycol, and propylene glycol
  - All units meet or exceed ASHRAE Standard 90.1 energy efficiency requirements
  - Advanced Coil Technology reduces evaporation directly off the coil and minimizes the potential for scaling and fouling, maintaining capacity
  - Premium efficient/inverter duty fan motors
  - Variety of coil configurations and HP options to minimize system energy use
- ✓ Sound Reduction Options
  - Standard fan is low sound and high efficiency
  - For further reduced sound levels, Low Sound Fans and sound attenuation are available (optional)

## RELIABLE YEAR-ROUND OPERATION

- ✓ Separate air intake louvers allow for easy visual inspection of the air-water interface
- ✓ BALTDRIIVE® Power Train fan system
  - No minimum fan speed is required
  - No gear oil heaters are needed
- ✓ Cooling tower duty motors designed for hostile environments

## LOW INSTALLATION COSTS

- ✓ Reduced weight simplifies rigging and lowers support steel costs
- ✓ Fewer coil connections reduce piping costs
- ✓ Modular design reduces assembly time
- ✓ Basinless unit construction (optional)

## EASY MAINTENANCE

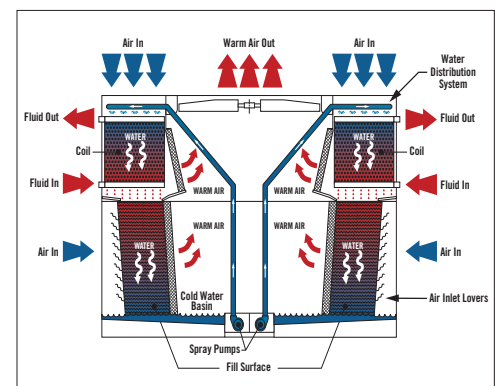
- ✓ Crossflow configuration provides direct access for easy maintenance to the cold water basin, spray distribution system, and drive system
- ✓ Spray distribution system is easy to inspect while the unit is operating
- ✓ Hinged access doors provide easy access to the unit's cold water basin, drift eliminators, fan drive system, and heat transfer coil
- ✓ Spacious plenum provides easy access to the fan drive system
- ✓ Patented hygienic cold water basin is sloped at the air intakes to eliminate stagnant water and reduce biological growth
- ✓ The fill surface is elevated above the sloped cold water basin to facilitate cleaning of critical areas



Dual Air Intake Models in an Enclosure



Stainless Steel Construction



Principle of Operation



The PFI Closed Circuit Cooling Tower with the OptiCoil™ System increases capacity by up to 30% or more\*, enabling the PFI model line to achieve either the lowest total installed cost or the lowest total cost of ownership\*. XE (Extreme Efficiency) models are also available with energy efficiency levels of up to five times the minimum requirements established in ASHRAE 90.1-2013, to further lower energy costs and reduce sound levels. The PFI model line with its patent-pending OptiCoil System, provides flexibility to meet the needs of owners, contractors, and engineers by bringing the most value to new or replacement applications where dry operation is a priority.

*\* Compared to traditional induced draft counterflow style closed circuit cooling towers*



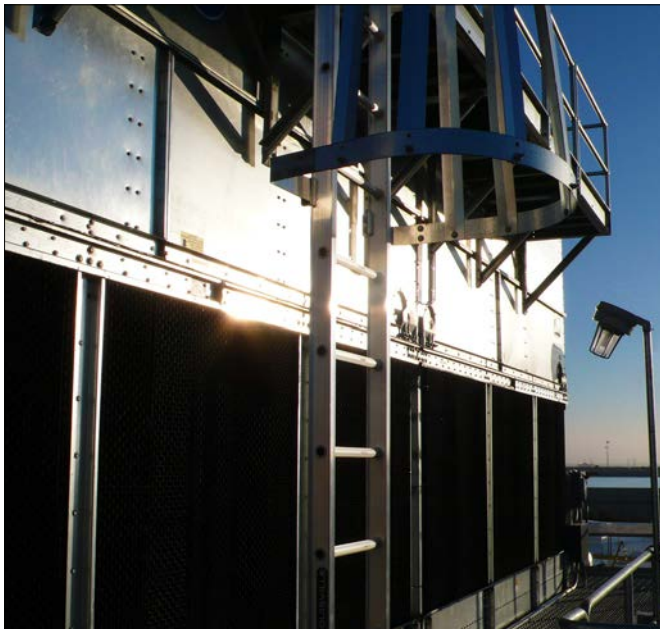
**Dry Operation for Severe Cold Weather Conditions**



**Ideal Competitor Replacement Unit**



**OptiCoil™ System**



PFI Closed Circuit Cooling Towers



## > Lowest Total Installed Cost

For contractors and owners looking for the lowest total installed cost, the PFi Closed Circuit Cooling Tower can lower installation costs by 30% or more via:

- ✓ Reduced crane, structural, and vibration isolation costs due to smaller footprint and lighter weight
- ✓ Reduced rigging and installation time with self-guiding pins and one-piece lift capability
- ✓ Less glycol required to achieve the same or higher heat transfer
- ✓ Smaller size of VFD due to a smaller HP motor
- ✓ Elimination of field thermal performance testing costs due to CTI certification for both water and glycol

Additionally, the PFi model line has many installation-friendly features, such as pre-assembled external service platforms that help significantly reduce installation times.

## > Lowest Total Cost-of-Ownership

- ✓ **LOW ENERGY COSTS:** For those looking for the lowest total cost of ownership, the PFi Closed Circuit Cooling Tower can help reduce energy costs by up to 50% or more with XE models featuring lower HP fan motors and the OptiSpray™ Technology featuring lower spray pump HP.
- ✓ **LOW OPERATING COST:** For those looking to reduce maintenance and repair costs, the PFi Closed Circuit Cooling Tower offers the following maintenance friendly features:
  - **Tool-Less Inward Sliding Access Door** – allows easy access to motor and drive components to reduce service times
  - **BranchLok Removal System** – reduces service times with tool-less spray branch removal
  - **Combined Inlet Shields** – Designed to be service-friendly for easy removal which helps reduce maintenance and service times

## > Lower Risks and Costs with Like-For-Like Replacement

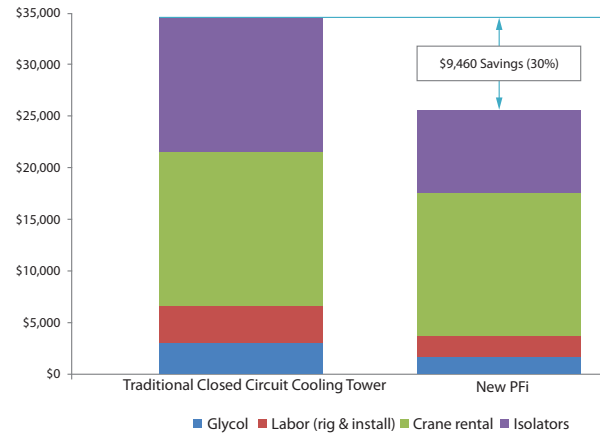
For replacement applications that require a like-for-like solution, the PFi model line can not only provide the lowest total installed cost or the lowest total cost of ownership, it can also lower the project risks and overall project time line. The PFi Closed Circuit Cooling Tower will deliver the same or even higher capacity, while minimizing switching costs through the reuse of existing:

- ✓ Steel support and vibration isolators
- ✓ Enclosure architecture
- ✓ Electrical infrastructure, starters and VFD

Lastly, the PFi model line is compliant with the latest building codes for energy efficiency, IBC codes for wind and seismic applications. The unit will perform per published ratings, as the entire model line is independently CTI certified.

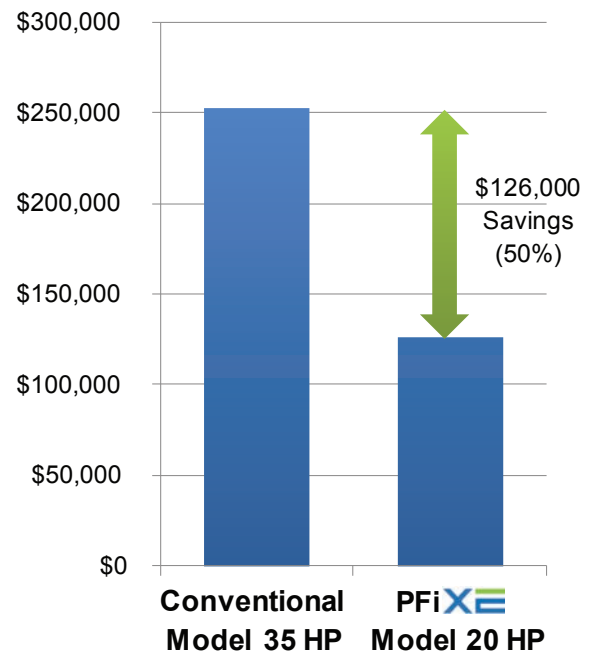


**Note:** Severe Cold Weather Concerns? The PFi can operate dry when the application requires it.



Typical 200-Ton Closed Circuit Cooling Tower Comparison

## Lifetime Energy Costs



XE Model Energy Comparison



# Series V

The VF1 and VFL Closed Circuit Cooling Towers are BAC's forced draft, counterflow products. Together they provide answers to several challenging applications. These products are constructed with centrifugal fans, which are inherently quiet. In addition, since the air intake is on one side, the unit can be installed so that side opposite the air intake faces sound sensitive direction. These units are also able to handle external static pressure, making them the ideal choice when the equipment needs to be located indoors and ducted.



**Indoor/Outdoor Flexibility**



**Solution for External Pressure Static Concerns**



**Low Profile Units are Ideal for Height Sensitive Installations**



VF1 Installation



Multi-cell VFL Installation





**Note:** Series V Closed Circuit Cooling Towers are certified by the Cooling Technology Institute using water, ethylene glycol, and propylene glycol as the process fluid.

## LOW ENVIRONMENTAL IMPACT

- ✓ Energy Efficient
  - Capacity is certified by the Cooling Technology Institute using water, ethylene glycol, and propylene glycol
  - All units meet or exceed ASHRAE Standard 90.1 energy efficiency requirements
  - Premium efficient/inverter duty fan motors
  - BALTI GUARD™ Fan System provides redundancy and energy savings by providing a pony motor (optional)
- ✓ Sound Reduction Options
  - Centrifugal fans have inherently low sound characteristics
  - Factory designed sound attenuation is available for both the air intake and discharge
  - Particularly sound sensitive installations can be accommodated by facing the quiet blank-off panel to the sound sensitive direction

## FLEXIBLE INSTALLATION

- ✓ Centrifugal fans can overcome the static pressure imposed by external ductwork, allowing the Series V to be installed indoors
- ✓ Low profile VFL has the fan located adjacent to the basin and casing for use in height sensitive installations

## RELIABLE YEAR-ROUND OPERATION

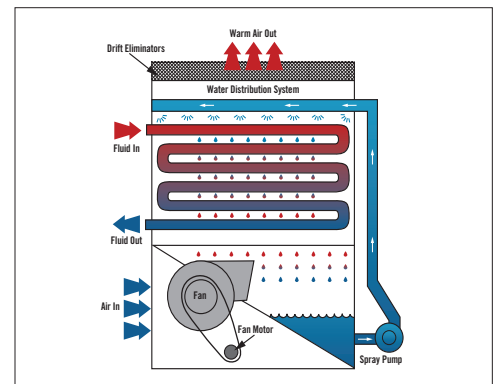
- ✓ Well suited for operation during low ambient conditions and can operate dry
- ✓ Motors, drives, and bearings are located in the dry airstream, protecting them from moisture, condensation, and icing

## LOW INSTALLED COST

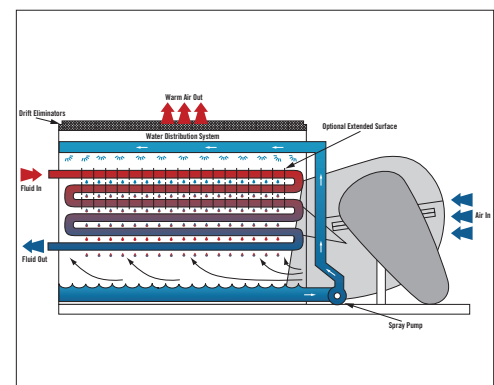
- ✓ All models mount directly on two parallel I-beams
- ✓ Modular design reduces assembly time (VFL models ship in one piece)
- ✓ All models ship with motors and drives factory installed and aligned



External Motor Access



Principle of Operation VF1



Principle of Operation VFL



# HXV Hybrid Towers

The HXV, BAC's hybrid product, provides efficient process cooling with maximum water savings and plume abatement. This product builds on the FXV design with the addition of a finned dry coil and allows BAC to provide the best of both evaporative and dry operation in a single, compact, energy efficient, and water conserving unit. The HXV is designed for projects where water costs are high, water supply is limited, plume is a concern, or applications with high temperature process fluids.



**Maximized Water Savings up to 70%**



**Suited for High Temperature Process Fluids above 180°F**



**Eliminates Plume in Dry Operation Mode**



Multi-cell HXV Installation



## LOW ENVIRONMENTAL IMPACT PRODUCT



**Note:** The HXV offers up to 70% water savings compared to conventional closed circuit cooling towers.

### LOW ENVIRONMENTAL IMPACT

- ✓ Energy Efficient
  - Advanced Coil Technology reduces evaporation directly off the coil and minimizes the potential for scaling and fouling, maintaining capacity
  - Closed loop cooling process further reduces fouling, maintaining process efficiency
  - Premium efficient/inverter duty fan motors
  - Independent fan operation (optional)
- ✓ Sound Reduction Options
  - Standard fan is low sound and high efficiency
  - For further reduced sound levels sound attenuation is available (optional)
- ✓ Significant water savings when run in dry operation mode
- ✓ Water savings versus conventional evaporative product even on a design day

### RELIABLE YEAR-ROUND OPERATION

- ✓ Dry operation mode of operation can be used in extremely cold climates where freezing is a concern
- ✓ BALTDRIIVE® Power Train fan system
  - No minimum fan speed is required
- ✓ Cooling tower duty motors designed for hostile environments

### EASY MAINTENANCE

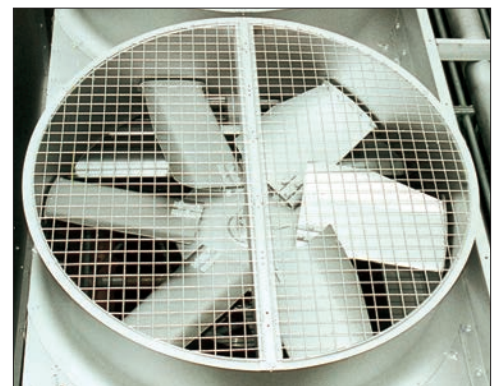
- ✓ Crossflow configuration provides direct access for easy maintenance to the cold water basin, spray distribution system, and drive system
- ✓ Hinged access doors and standard internal walkway provide easy access to the unit's cold water basin, drift eliminators, fan drive system, and heat transfer coil
- ✓ Electrostatic coating on dry finned coils prevent corrosion without impeding performance
- ✓ Drift eliminators are easily removed for access to the prime surface coil
- ✓ Spray distribution system is easy to inspect while the unit is operating



**Dry Finned Coil with Electrostatic Coating**



**Prime Surface Coil is Hot-dip Galvanized After Fabrication**



**High Efficiency Fan**



# HXV Hybrid Towers

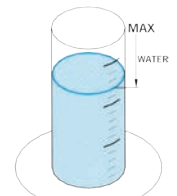
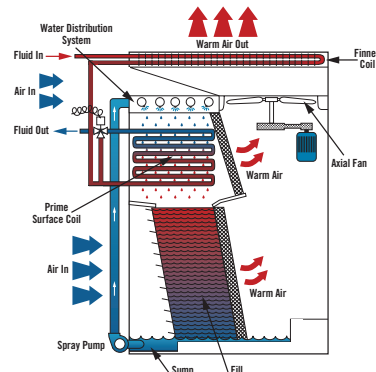
## MODES OF OPERATION

### COMBINED WET/DRY MODE:

- ✓ This mode employs the use of both coils, the dry finned coil and the prime surface coil. Water is sprayed over the prime surface coil, allowing evaporative cooling to occur, before falling over the fill, further cooling the spray water.

### BENEFITS:

- ✓ Provides the most capacity by employing the use of both coils. Water is saved in this mode as the finned, dry coil, reduces the amount of heat that needs to be rejected in the prime surface coil. Flow through the wet coil can also be controlled and adjusted as ambient temperature and/or heat load drops.



Water Consumption

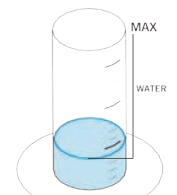
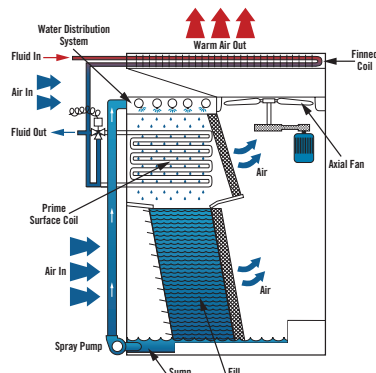
Combined Dry/Wet Operation Mode

### ADIABATIC MODE:

- ✓ In this mode, the process fluid bypasses the prime surface coil, and instead only circulates through the dry finned coil. Recirculating water saturates and adiabatically cools the incoming outside air, reducing the air temperature within 2-3°F of the wet-bulb and greatly increasing the rate of sensible heat transfer.

### BENEFITS:

- ✓ Provides a middle capacity range when outside temperatures will not allow for dry cooling.



Water Consumption

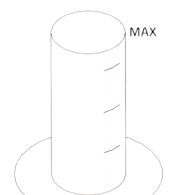
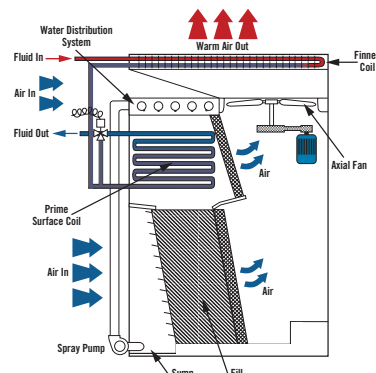
Adiabatic Mode

### DRY COOLING MODE:

- ✓ In this mode, the spray water is turned off, saving pump energy, and the fluid to be cooled is circulated through both the finned and prime surface coils. Both coils receive full flow, utilizing the maximum heat transfer surface area.

### BENEFITS:

- ✓ No water consumption occurs in this mode and plume is completely eliminated. This is the best mode of operation during extremely cold weather.



Water Consumption

Dry Mode

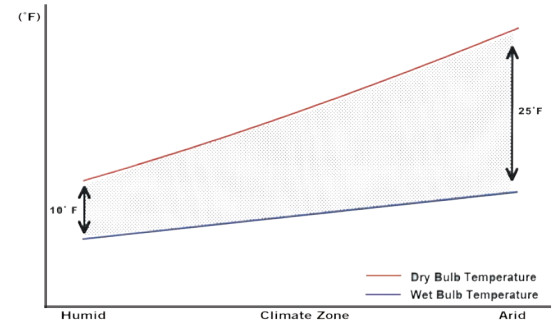
# How will the HXV WORK for you?

## HXV First Cost Benefits

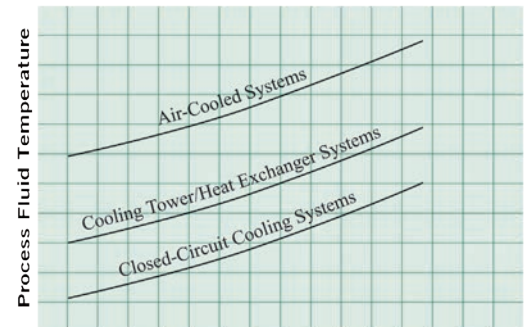
Heat rejection equipment must be selected for the maximum heat load at summer peak air temperatures. In most climates peak wet-bulb temperatures are significantly lower than peak dry-bulb temperatures. Evaporative cooling equipment based on the ambient air wet-bulb therefore has a greater temperature driving force, allowing the use of lower system temperatures. This greater driving force also allows the use of less heat transfer surface area. Since the HXV utilizes evaporative cooling during peak load operation it inherently benefits from this advantage. Evaporatively cooled units such as the HXV have a plan area and fan horsepower advantage over the typical air-cooled arrangement, saving on support structures and electrical hook-ups. The HXV design also avoids the corrosion and scaling that can be associated with spraying of standard air-cooled equipment on design days for additional capacity. The lower process fluid temperatures that can be achieved compared to air-cooled systems and the greatly reduced fouling factors of closed loop cooling result in lower first cost of process equipment such as chillers or refrigeration compressors. Lastly, the costs associated with plume abatement are eliminated, as the design is inherently plume-free.

## HXV Operating Cost Benefits

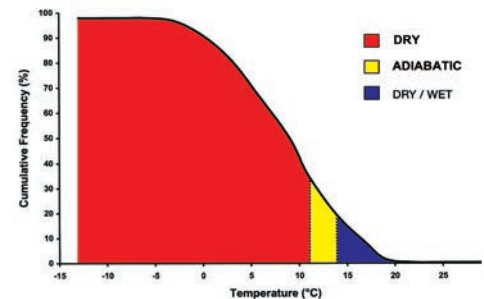
Due to its water saving concept and combined flow design, the HXV offers significant operating cost benefits. Water consumption is minimized throughout the year. During peak summer operation a large amount of heat load is already transferred by the finned coil. As the ambient temperature and/or heat load drops, the amount of evaporative heat transfer is further reduced by controlling the flow through the wet coil. This reduces the evaporation loss and blow-down as well as water treatment requirements compared to conventional evaporative cooling equipment. In the adiabatic mode only a small amount of water is needed to saturate the air and the amount of blow-down is reduced even further. Finally in the dry mode no water is used at all (while saving the energy associated with running the spray pump). With HXV hybrid units, water savings up to 70% as compared to traditional closed circuit systems is possible. Depending on local water costs and availability, this advantage alone can pay for the equipment in as little as two years through cost savings in water use, water treatment chemicals, and higher system efficiencies. In addition, fouling potential associated with open circuit cooling towers is eliminated through both the closed loop cooling system and the Combined Flow Technology design of the HXV, assuring peak efficiency and energy savings over time. Finally, the induced draft propeller fan design results in low fan energy requirements compared to centrifugal fan units.



Dry-bulb/Wet-bulb Difference Versus Climate Zone



Air Wet Bulb Temperature  
Closed Circuit Cooling Systems offer the Lowest Fluid Temperatures



Typical Annual Distribution of Ambient Temperature with the Three Operating Modes

# Comparison Table

ITEMS SHADED IN BLUE ARE BAC EXCLUSIVE FEATURES AND OPTIONS

Standard Features	FXV	FXV Dual	PFi	VF1	VFL	HXV
Axial Fan	•	•	•			•
Centrifugal Fan <sup>[1]</sup>				•	•	
Large Plenum Area for Access	•	•				•
Nominal Tons	29-424	344-624	18-360	4.1-543	3.9-108	160 - 305
Serpentine Coil (HDGAF)	•	•	•	•	•	•
OptiCoil™ System			•			
Shake Table Tested for IBC Compliance	2.4g		3.75g			
Premium Efficient/Inverter Duty Fan Motors	•	•	•	•	•	•
CTI Standard 201	•	•	•	•	•	
ASHRAE 90.1 compliant	•	•	•	•	•	
<b>Construction Options</b>						
Welded Type 304 Stainless Steel Cold Water Basin <sup>[2]</sup>	•	•	•			•
TriArmor® Corrosion Protection System	•		•			
Thermosetting Hybrid Polymer		•	•	•	•	•
EVERTOUGH™ Construction	•		•			
Stainless Steel Construction	•	•	•	•	•	•
<b>Coil Options</b>						
Cleanable Header Coil	•		•	•	•	
Straight Through Cleanable Coil	•		•	•		
Stainless Steel Coils	•	•	•	•	•	•
ASME U Designator Coil	•	•	•	•	•	
Extended Surface Coil	•		•	•	•	
<b>Drive System</b>						
BALTDRIIVE® Power Train	•	•	•			•
Gear Drive		•				
BALTIQUARD™ Fan System	•	•		•	•	•
Independent Fan Operation	•		•			•
<b>Other Options and Accessories</b>						
Low Sound Fan	•	•	•			•
Whisper Quiet Fan	•		•			
Sound Attenuation	•	•	•	•	•	•
Handrails with Ladder <sup>[3]</sup>		•		•		
External Access Platform with Ladder <sup>[3]</sup>	•	•	•	•		•
Internal Ladder	•	•				•
Internal Access Platform	•	•				•
Basinless Unit Construction		•				
Motor Removal System	•	•	•			
Single Point Wiring (Fan Motors and Vibration Cut Out Switch)	•		•			
Redundant Pumps	•	•	•			•
Internal Walkway	Standard	•				Standard
Top Combined Inlet Shields	•					

**Note 1:** Centrifugal fan units can overcome ESP imposed by ductwork or other restrictions. A larger fan motor may be required. Contact your local BAC Representative with any questions.

**Note 2:** Seams between the panels inside the cold water basin are welded for FXV, FXV Dual Air Intake, and PFi. The basin is leak tested and welded seams are provided with a five year leak-proof warranty.

**Note 3:** Safety cages available on ladders when required by local safety standards.

# Closed Circuit Cooling Tower Questions?

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