



# Evaporative Cooling Equipment

## Start-Up Checklist

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**Please refer to the product specific Operation and Maintenance Manual and Rigging Guidelines for detailed instructions.**

# Safety and Equipment Precautions



## DANGER

- **DANGER:** Do not perform any service on or near the fans, motors, and drives, or inside the unit without first ensuring that the fans and pumps are disconnected, locked out, and tagged out.



## WARNING

- **WARNING:** When access to the top of the unit is desired, the purchaser/end-user is cautioned to use appropriate means to comply with applicable safety standards related to working on elevated surfaces.
- **WARNING:** When the fan speed of the unit is to be changed from the factory set speed, including changes achieved by the use of a variable fan speed device, steps must be taken to avoid operation at or near the fan's "critical speed" which could result in fan failure and possible personal injury or damage.
- **WARNING:** The recirculating water system may contain chemicals or biological contaminants, including Legionella, which could be harmful if inhaled or ingested. Personnel exposed directly to the discharge airstream and the associated drift mists, generated during operation of the water distribution system and/or fans, or mists produced by high pressure water jets or compressed air (if used to clean components of the recirculating water system), must wear respiratory protection equipment approved for such use by governmental occupational safety and health authorities.
- **WARNING:** All electrical, mechanical, and rotating machinery are potential hazards, particularly for those not familiar with their design, construction, and operation. Accordingly, use appropriate lockout procedures. Adequate safeguards (including the use of protective enclosures where necessary) should be taken with this equipment both to safeguard the public from injury and to prevent damage to the equipment, its associated system, and the premises.
- **WARNING:** A lockable disconnect switch should be located within sight of the unit for each fan motor associated with this equipment. Before performing any type of service or inspection, make certain that all power has been disconnected, and the switch is locked out in the "OFF" position.
- **WARNING:** Dangerous voltages are present in this equipment. Disconnect the electrical service of the source and follow proper lock out and tag out procedures to de-energize the circuit before servicing or replacing components.



## CAUTION

- **CAUTION:** The operation, maintenance, and repair of this equipment shall be undertaken only by personnel authorized and qualified to do so. All such personnel shall be thoroughly familiar with the equipment, the associated system and controls, and the procedures set forth in this document. Proper care, personal protective equipment, procedures, and tools must be used in handling, lifting, installing, operating, maintaining, and repairing this equipment to prevent personal injury and/or property damage.
- **CAUTION:** Openings and/or submerged obstructions may exist in the bottom of the cold water basin. Use caution when walking inside this equipment.
- **CAUTION:** Follow exposure control and personal protective equipment requirements as outlined in the Materials Safety Data Sheet (MSDS) for all recommended lubricant and maintenance materials.



## NOTICE

- **Please refer to the product specific Operation and Maintenance Manual and Rigging Guidelines for detailed instructions.**
- The basin heater is not designed to prevent icing during unit operation.
- The heater control panel temperature/low level control can only be used with the supplied combination temperature/liquid level sensor probe. Please contact your local BAC Representative for replacement parts.
- For the stand alone BAC heater control panel, do not operate the system unattended or for extended periods of time during test mode (resistor across terminals T1 and T2). Operation in water temperatures above 45°F (7.2°C) could damage the unit.
- For heater control panels, do not operate the system unattended or for extended periods of time with terminals G1-G2 jumpered. A low liquid level condition could occur, and the system will not shut off which could result in damage to the heater and unit.
- Check to ensure the controls for the fan motor are set to allow a maximum of six on-off cycles per hour to prevent motor overload.
- For fan motors controlled with VFDs with a switching frequency of 2.5 kHz, the line lead length cannot exceed 300 feet. If the switching frequency is higher than 2.5 kHz and/or the line lead length exceeds 300 feet, a dV/dT output filter is recommended to protect the motor.
- When reversing the direction of fan rotation, allow the fan to come to a complete stop before restarting the motor.
- Only lubricate the bearings with one of the compatible water resistant greases **listed in your Operation and Maintenance Manual.**
- Do not use steam or high pressure water to clean PVC eliminators or materials other than steel.
- Never use chloride or chlorine based solvents such as bleach or muriatic (hydrochloric) acid to clean stainless steel. It is important to rinse the surface with warm water and wipe with a dry cloth after cleaning.
- Gear drives should not be used with Wye-Delta (Y- $\Delta$ ) motors.
- For installations with 2-speed motors when slowing from high speed, allow a minimum 15-second time delay for the fan to slow down before energizing the low-speed winding.
- For towers with optional gear drives, do not mix synthetic lubricants and mineral oils. Attempt to use only one brand of lubricant at all times. If the brand is changed, completely drain the old oil before filling the gear with new oil.
- Do not use power tools on the Whisper Quiet Fan.

## Warranties

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

# Site Information

Job Name	Owner's Name	Start-up Date	Sales Representative Name	Report Prepared by

Job Location	Owner's Phone Number	Model Number	Serial Number	Preparers's Phone Number

## Start-Up Checklist: Unit OFF

**Note: This checklist must be completed while the unit is not energized. For multi-cell installations please provide a separate checklist for each cell.**

Water System	Yes	No	Comments
Is the water distribution system clean, free of dirt and debris?	<input type="checkbox"/>	<input type="checkbox"/>	
Are the hot water basin cover tie-down plates removed? Gravity distribution systems only.	<input type="checkbox"/>	<input type="checkbox"/>	
Is the spray pump properly installed and in satisfactory condition? Pressurized spray systems only.	<input type="checkbox"/>	<input type="checkbox"/>	
Is the cold water basin clean, free of dirt and debris?	<input type="checkbox"/>	<input type="checkbox"/>	
Is the make-up water system installed and in satisfactory condition?	<input type="checkbox"/>	<input type="checkbox"/>	
Is the manual drain closed / operable?	<input type="checkbox"/>	<input type="checkbox"/>	
Is the cold water basin filled to the overflow level?	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Basin Heater (if purchased)</b>			
Is the basin heater installed and wired properly? <b>Note:</b> Please ensure that the heating element is completely submerged before energizing the main disconnect.	<input type="checkbox"/>	<input type="checkbox"/>	
Select type of basin heater: <input type="checkbox"/> Electric <input type="checkbox"/> Steam coil <input type="checkbox"/> Steam injection			
Number of heaters installed _____			
KW and Voltage of heaters installed KW _____ / Voltage _____			
Is the basin heater thermostat set at 45°F minimum? Dependent upon control heater option selection.	<input type="checkbox"/>	<input type="checkbox"/>	
Are the basin heater controls or control panel installed and wired properly?	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Water Treatment System (by third party)</b>			
Is there a water treatment program in place? Check all that apply. <input type="checkbox"/> Filtration <input type="checkbox"/> Separation <input type="checkbox"/> Non chemical water treatment <input type="checkbox"/> Chemical water treatment	<input type="checkbox"/>	<input type="checkbox"/>	
<b>*Please refer to the product specific Operation and Maintenance Manual and Rigging Guidelines for detailed instructions.</b>			

# Start-Up Checklist: Unit OFF

**Note:** This procedure must be conducted while the unit is not energized. For multi-cell installations please provide a separate checklist for each cell.

Heat Transfer System		Yes	No	Comments				
Is the fill in satisfactory condition? If applicable.		<input type="checkbox"/>	<input type="checkbox"/>					
Is the coil in satisfactory condition? If applicable.		<input type="checkbox"/>	<input type="checkbox"/>					
Is the coil piped and ready for process fluid? If applicable.		<input type="checkbox"/>	<input type="checkbox"/>					
Please specify the type of glycol or refrigerant used. If glycol is used, please specify the percentage. If applicable.								
Mechanical System - Fan		Fan 1		Fan 2		Fan 3		Comments
		Yes	No	Yes	No	Yes	No	
Total number of fans per cell:								
Please indicate the type of fan: <input type="checkbox"/> Axial <input type="checkbox"/> Centrifugal								
Is the fan guard installed? If applicable.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the fan cowl installed? Axial fan only.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Number of blades on fan? Axial fan only.								
Are the fan blades secure? Axial fan only.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is there proper tip clearance on all blades?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Fan pitch (axial fans only). If possible, please specify pitch for each blade.								
Rotate fan without power to assure clearance. Does the fan rotate freely?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are the fan and motor sheaves properly installed and aligned? <b>Note:</b> Alignment must be completed by the installer / mechanical contractor.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the belt tension properly adjusted to 1/4" to 3/8" deflection?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Mechanical Drive System		Motor 1		Motor 2		Motor 3		Comments
		Yes	No	Yes	No	Yes	No	
Total number of motors? _____								
Motor location: <input type="checkbox"/> Internal <input type="checkbox"/> External								
Motor information: <b>Motor 1:</b> Serial Number:      HP:      Speed:      Frequency:      Service Factor (S.F.):      Voltage:      Amperage: <b>Motor 2:</b> Serial Number:      HP:      Speed:      Frequency:      Service Factor (S.F.):      Voltage:      Amperage: <b>Motor 3:</b> Serial Number:      HP:      Speed:      Frequency:      Service Factor (S.F.):      Voltage:      Amperage:								
Is the motor base secure and bolts tightened?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have the proper condensation plugs been opened on the motor? <b>Note:</b> plugs located on down side of the motor should be opened.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the vibration cutout switch mounted and wired properly? If applicable.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Has the bearing lubrication been checked? If applicable.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are extended lube lines properly installed and charged? If applicable.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are the automatic bearing greasers installed? If applicable.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the grease type approved? Grease type: _____ Manufacturer: _____		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>*Please refer to the product specific Operation and Maintenance Manual and Rigging Guidelines for detailed instructions.</b>								

Gear Drive System (Select Products Only)	Yes	No	Comments
Please provide gear drive nameplate information. Serial Number: _____ Catalog Number: _____			
Does nameplate indicate synthetic or mineral oil? Please specify:			
Is the gear oil level correct?	<input type="checkbox"/>	<input type="checkbox"/>	
Is the vent line secure and free of damage?	<input type="checkbox"/>	<input type="checkbox"/>	
If the gear has extended oil line, is the ball valve open?	<input type="checkbox"/>	<input type="checkbox"/>	
Have the motor and gear drive been properly installed and aligned? <b>Note:</b> Alignment must be completed by the installer / mechanical contractor.	<input type="checkbox"/>	<input type="checkbox"/>	

### Variable Frequency Drive

**Note:** All wiring between VFD, motor, main circuit breaker, controls, sensors and Building Management System must be completed prior to start-up by the electrical and/or controls contractor who must be on site during start-up. In addition to this checklist, please ensure that the requirements from the VFD manufacturer are met.

General Information	Yes	No	Comments
How many VFD's are on site?			
Will the VFD start up be conducted by the BAC Representative? If not, please attach a copy of the of the VFD pre-start up checklist, commissioning report, AND record the following information upon unit start up.	<input type="checkbox"/>	<input type="checkbox"/>	
Electrical Contractor: Start-Up Commissioner Name: _____ Certification Number: _____ Phone: _____			
Building Management System Technician (if applicable): _____ Contact: _____ Phone: _____			
VFD Manufacturer _____			
Parties requiring VFD operational overview (if applicable). Contact: _____ Phone: _____			
VFD nameplate information: <b>VFD 1:</b> Serial Number: _____ HP: _____ Amps: _____ Line Voltage: _____ <b>VFD 2:</b> Serial Number: _____ HP: _____ Amps: _____ Line Voltage: _____ <b>VFD 3:</b> Serial Number: _____ HP: _____ Amps: _____ Line Voltage: _____			

### Confirm Installation Conditions Comply with Electrical Requirements

VFD installation	VFD 1		VFD 2		VFD 3		Comments
	Yes	No	Yes	No	Yes	No	
Does site voltage match the VFD nameplate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is drive to motor sizing verified and correct?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Enclosure Rating _____							
Is the VFD and/or enclosure securely fastened?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the VFD and/or enclosure not interfering with air intake?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the line voltage properly connected to VFD and/or enclosure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is grounding wiring complete?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Motor installation							
Motor line length over 300ft. If yes, is there an output filter installed? Manufacturer: _____ Model Number: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is there a grounding ring installed? If applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**\*Please refer to the product specific Operation and Maintenance Manual and Rigging Guidelines for detailed instructions.**

Control System	Yes	No	Comments
Is the control system installed and ready to operate? (e.g. temperature or pressure sensor, controller or BMS)	<input type="checkbox"/>	<input type="checkbox"/>	
Is the control wiring run in separate conduit than the power wiring?	<input type="checkbox"/>	<input type="checkbox"/>	
Is the control wiring in place and complete?	<input type="checkbox"/>	<input type="checkbox"/>	
<b>VFD input signals. Please check those that apply</b>			
<input type="checkbox"/> Temperature sensor provided by BAC <input type="checkbox"/> Pressure sensor provided by BAC <input type="checkbox"/> Controller provided by BAC <input type="checkbox"/> Temperature sensor provided by others Please indicate manufacturer: _____ <input type="checkbox"/> Pressure sensor provided by others Please indicate manufacturer: _____ <input type="checkbox"/> Building Management System			

## Start-Up Checklist: Unit ON

**Note: The following procedure must be conducted when the unit is energized. For multi-cell installations please provide a separate checklist for each cell.**

Water System	Yes	No	Comments
Are all water connections secure, fully inspected, and leak free?	<input type="checkbox"/>	<input type="checkbox"/>	
Has the hot water basin water level been checked? Water Depth _____ Gravity distribution systems only	<input type="checkbox"/>	<input type="checkbox"/>	
Are spray header, branches, and nozzles functional? Pressurized spray systems only	<input type="checkbox"/>	<input type="checkbox"/>	
Is the cold water level at operating height?	<input type="checkbox"/>	<input type="checkbox"/>	
Is the make-up system operating properly?	<input type="checkbox"/>	<input type="checkbox"/>	
Has the bleed rate been checked and adjusted?	<input type="checkbox"/>	<input type="checkbox"/>	
Does the water basin overflow when unit is shut down? Please ensure no overflow.	<input type="checkbox"/>	<input type="checkbox"/>	
Is the basin heater low water cut-out switch operating properly?	<input type="checkbox"/>	<input type="checkbox"/>	
Are the basin heater controls working properly? (e.g. heaters shut down appropriately)	<input type="checkbox"/>	<input type="checkbox"/>	
Is the water treatment working properly? (by third party)	<input type="checkbox"/>	<input type="checkbox"/>	
Confirm operating levels if more than one cell. _____ Meets design?	<input type="checkbox"/>	<input type="checkbox"/>	
Are the drift eliminators secured properly?	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Heat Transfer System</b>			
Is there any splash out of water during operation?	<input type="checkbox"/>	<input type="checkbox"/>	
Is the recirculating water spray pump operating correctly? If applicable.	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Mechanical System</b>			
Are the fan(s) rotating in the correct direction?	<input type="checkbox"/>	<input type="checkbox"/>	
Do the fan(s) rotate freely, with no audible fan interference?	<input type="checkbox"/>	<input type="checkbox"/>	
Is the vibration cutout switch operating properly? If applicable.	<input type="checkbox"/>	<input type="checkbox"/>	
Is the vibration cutout switch remote reset switch operating properly? If applicable.	<input type="checkbox"/>	<input type="checkbox"/>	
<b>*Please refer to the product specific Operation and Maintenance Manual and Rigging Guidelines for detailed instructions.</b>			

# Start-Up Checklist: Unit ON

**Note:** The following procedure must be conducted when the unit is energized. For multi-cell installations please provide a separate checklist for each cell.

## Other Drive Systems

### Variable Frequency Drive

**Note:** All wiring between VFD, motor, main circuit breaker, controls, sensors and Building Management System must be completed prior to start-up by the electrical and/or controls contractor who must be on site during start-up. In addition to this checklist, please ensure that the requirements from the VFD manufacturer are met.

### Record the following parameters

Line voltage, phase-phase:  
A-B: \_\_\_\_\_ / B-C: \_\_\_\_\_ / A-C: \_\_\_\_\_

Line voltage, phase-ground:  
A-G: \_\_\_\_\_ / B-G: \_\_\_\_\_ / C-G: \_\_\_\_\_

Line Current (each Phase):  
A: \_\_\_\_\_ / B: \_\_\_\_\_ / C: \_\_\_\_\_

DC Bus Voltage:  
B+ -B: \_\_\_\_\_ / B+-G: \_\_\_\_\_ / B-G: \_\_\_\_\_

Minimum Hertz: \_\_\_\_\_ / Maximum Hertz: \_\_\_\_\_

### Software Selection

System Software File Number: \_\_\_\_\_

VFD Software Application Chosen: \_\_\_\_\_

Parameter Settings/Requirements (if different than defaults)	Yes	No
Specify switching frequency _____		
Has the owner determined Sleep Speed Limit? If so what speed _____	<input type="checkbox"/>	<input type="checkbox"/>
Has the owner determined Wake Up Limit? If so what is the Wake Up Limit _____	<input type="checkbox"/>	<input type="checkbox"/>
Has the owner determined Temperature/Pressure set points? They are _____	<input type="checkbox"/>	<input type="checkbox"/>
Have resonance frequencies been blocked? Frequency Ranges? _____ - _____ <b>Note:</b> Please refer to the Common Operation & Maintenance Manual for Resonant Speed Identification Procedure and Guidelines	<input type="checkbox"/>	<input type="checkbox"/>
Is the VFD operating correctly? Have all parameters/settings have been checked?	<input type="checkbox"/>	<input type="checkbox"/>
Are VFD inputs (sensors) working properly?	<input type="checkbox"/>	<input type="checkbox"/>

**\*Please refer to the product specific Operation and Maintenance Manual and Rigging Guidelines for detailed instructions.**