Evaporative Cooling Equipment
Start-Up Checklist

CONTENTS

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-△) 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?	☐	☐	
Are the hot water basin cover tie-down plates removed? Gravity distribution systems only.	☐	☐	
Is the spray pump properly installed and in satisfactory condition? Pressurized spray systems only.	☐	☐	
Is the cold water basin clean, free of dirt and debris?	☐	☐	
Is the make-up water system installed and in satisfactory condition?	☐	☐	
Is the manual drain closed / operable?	☐	☐	
Is the cold water basin filled to the overflow level?	☐	☐	
Basin Heater (if purchased)			
Is the basin heater installed and wired properly? **Note:** Please ensure that the heating element is completely submerged before energizing the main disconnect.	☐	☐	
Select type of basin heater: ☐ Electric ☐ Steam coil ☐ 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.	☐	☐	
Are the basin heater controls or control panel installed and wired properly?	☐	☐	
Water Treatment System (by third party)			
Is there a water treatment program in place? Check all that apply. ☐ Filtration ☐ Separation ☐ Non chemical water treatment ☐ Chemical water treatment	☐	☐	
***Please refer to the product specific Operation and Maintenance Manual and Rigging Guidelines for detailed instructions.**			

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.	☐	☐	
Is the coil in satisfactory condition? If applicable.	☐	☐	
Is the coil piped and ready for process fluid? If applicable.	☐	☐	
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: ☐ Axial ☐ Centrifugal							
Is the fan guard installed? If applicable.	☐	☐	☐	☐	☐	☐	
Is the fan cowl installed? Axial fan only.	☐	☐	☐	☐	☐	☐	
Number of blades on fan? Axial fan only.							
Are the fan blades secure? Axial fan only.	☐	☐	☐	☐	☐	☐	
Is there proper tip clearance on all blades?	☐	☐	☐	☐	☐	☐	
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?	☐	☐	☐	☐	☐	☐	
Are the fan and motor sheaves properly installed and aligned? **Note:** Alignment must be completed by the installer / mechanical contractor.	☐	☐	☐	☐	☐	☐	
Is the belt tension properly adjusted to 1/4" to 3/8" deflection?	☐	☐	☐	☐	☐	☐	

Mechanical Drive System	Motor 1		Motor 2		Motor 3		Comments
	Yes	No	Yes	No	Yes	No	
Total number of motors? _____							
Motor location: ☐ Internal ☐ External							
Motor information: **Motor 1:** Serial Number: HP: Speed: Frequency: Service Factor (S.F.): Voltage: Amperage: **Motor 2:** Serial Number: HP: Speed: Frequency: Service Factor (S.F.): Voltage: Amperage: **Motor 3:** Serial Number: HP: Speed: Frequency: Service Factor (S.F.): Voltage: Amperage:							
Is the motor base secure and bolts tightened?	☐	☐	☐	☐	☐	☐	
Have the proper condensation plugs been opened on the motor? **Note**: plugs located on down side of the motor should be opened.	☐	☐	☐	☐	☐	☐	
Is the vibration cutout switch mounted and wired properly? If applicable.	☐	☐	☐	☐	☐	☐	
Has the bearing lubrication been checked? If applicable.	☐	☐	☐	☐	☐	☐	
Are extended lube lines properly installed and charged? If applicable.	☐	☐	☐	☐	☐	☐	
Are the automatic bearing greasers installed? If applicable.	☐	☐	☐	☐	☐	☐	
Is the grease type approved? Grease type: _____ Manufacturer: _____	☐	☐	☐	☐	☐	☐	
***Please refer to the product specific Operation and Maintenance Manual and Rigging Guidelines for detailed instructions.**							

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?	☐	☐	
Is the vent line secure and free of damage?	☐	☐	
If the gear has extended oil line, is the ball valve open?	☐	☐	
Have the motor and gear drive been properly installed and aligned? **Note:** Alignment must be completed by the installer / mechanical contractor.	☐	☐	

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.	☐	☐	
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: **VFD 1:** Serial Number:_____ HP:_____ Amps:_____ Line Voltage:_____ **VFD 2:** Serial Number:_____ HP:_____ Amps:_____ Line Voltage:_____ **VFD 3:** Serial Number:_____ HP:_____ Amps:_____ Line Voltage:_____			

Confirm Installation Conditions Comply with Electrical Requirements

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

***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)	☐	☐	
Is the control wiring run in separate conduit than the power wiring?	☐	☐	
Is the control wiring in place and complete?	☐	☐	
VFD input signals. Please check those that apply			

☐ Temperature sensor provided by BAC
☐ Pressure sensor provided by BAC
☐ Controller provided by BAC
☐ Temperature sensor provided by others
Please indicate manufacturer:_____
☐ Pressure sensor provided by others
Please indicate manufacturer: _____
☐ 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?	☐	☐	
Has the hot water basin water level been checked? Water Depth _____ Gravity distribution systems only	☐	☐	
Are spray header, branches, and nozzles functional? Pressurized spray systems only	☐	☐	
Is the cold water level at operating height?	☐	☐	
Is the make-up system operating properly?	☐	☐	
Has the bleed rate been checked and adjusted?	☐	☐	
Does the water basin overflow when unit is shut down? Please ensure no overflow.	☐	☐	
Is the basin heater low water cut-out switch operating properly?	☐	☐	
Are the basin heater controls working properly? (e.g. heaters shut down appropriately)	☐	☐	
Is the water treatment working properly? (by third party)	☐	☐	
Confirm operating levels if more than one cell. _____ Meets design?	☐	☐	
Are the drift eliminators secured properly?	☐	☐	
Heat Transfer System			
Is there any splash out of water during operation?	☐	☐	
Is the recirculating water spary pump operating correctly? If applicable.	☐	☐	
Mechanical System			
Are the fan(s) rotating in the correct direction?	☐	☐	
Do the fan(s) rotate freely, with no audible fan interference?	☐	☐	
Is the vibration cutout switch operating properly? If applicable.	☐	☐	
Is the vibration cutout switch remote reset switch operating properly? If applicable.	☐	☐	

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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 _____	☐	☐
Has the owner determined Wake Up Limit? If so what is the Wake Up Limit_____	☐	☐
Has the owner determined Temperature/Pressure set points? They are _____	☐	☐
Have resonance frequencies been blocked? Frequency Ranges? _____-_____ **Note:** Please refer to the Common Operation & Maintenance Manual for Resonant Speed Identification Procedure and Guidelines	☐	☐
Is the VFD operating correctly? Have all parameters/settings have been checked?	☐	☐
Are VFD inputs (sensors) working properly?	☐	☐

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

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