BALTIMORE
AIRCOIL AUSTRALIA

Low Profile Series V

OPERATION & MAINTENANCE MANUAL

Construction Details

1. HEAVY DUTY CONSTRUCTION

• all major structural components are constructed of heavy gauge galvanized steel.
• double brake flanges maximize strength of panels.
• exterior of unit is finished with zinc-chromatized aluminum.

2. WATER DISTRIBUTION SYSTEM

• large diameter non-clog nozzles are oriented for optimum water distribution over the heat transfer surface.
• schedule 40 PVC spray branches.
• grommeted nozzles and branches allow quick removal for cleaning

3. ELIMINATORS

• constructed of U.V. resistant P.V.C.
• three distinct changes in air direction reduce drift losses to only .002% of design flow.
• assembled in easy to handle sections which can be easily removed
for access to the spray branches and nozzles.

4. HIGH EFFICIENCY AIR MOVING SYSTEM

• a close-coupled transition duct uniquely curved and flared maximizes efficiency
• forwardly curved centrifugal fan wheels are statically and dynamically balanced
• two-piece fan housings allow easy fan and shaft removal

5. FAN SHAFT AND BEARINGS

• no intermediate bearings
• supported on each end by heavy duty, grease packed, relubricable ball bearings with an L10 life of 40,000 hours

6. FAN MOTOR

• TEFC with IP55 protection
• located in protected area beneath the fan housing
• mounted on a motor base with single bolt adjustment
• easily accessible and located low to the ground

7. V-BELT DRIVE SYSTEM WITH DRIVE GUARD

• designed for not less than 150% of motor nameplate horsepower
• drive guard provides protection from moving parts

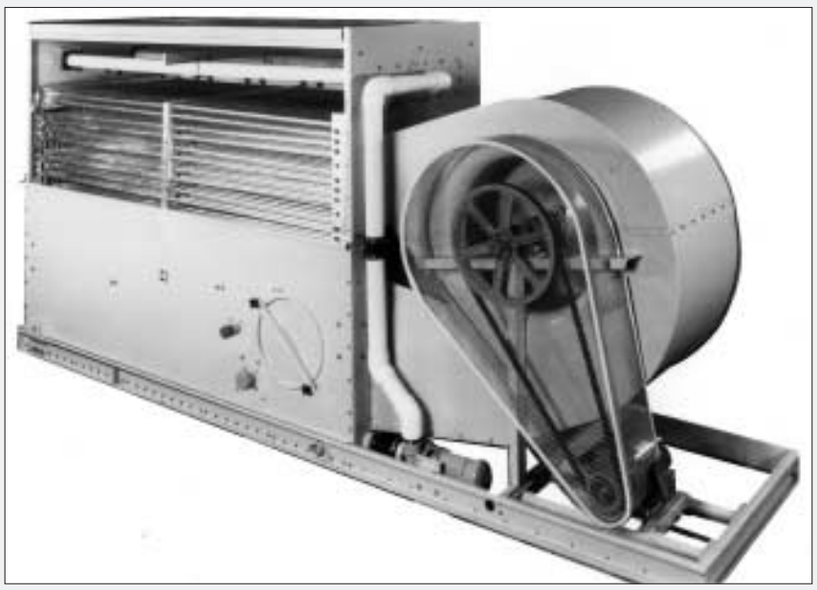

Figure 1. Model VCL Evaporative Condenser and Model VFL Fluid Cooler

8. STRAINER ASSEMBLY
- light-weight, large area lift-out strainer screens
- stationary anti-vortexing assembly

9. CIRCULAR ACCESS DOORS
- easy access to float valve and strainer

10. WATER MAKE-UP VALVE
- actuated by a large diameter, unsinkable, polystyrene-filled plastic float ball constrained for operational stability

11. BACount WET DECK SURFACE
- durable polyvinyl chloride (PVC) construction
- sloping design which maximizes capacity while minimizing height
- efficient heat transfer surface minimizes power requirements
- flame spread rating of 5 per ASTM standard E84-77a
- optional chlorinated polyvinyl chloride (CPVC) heat transfer surface available for high temperature applications

12. HEAT TRANSFER SYSTEM
- prime surface steel coil
- encased in steel framework and hot-dip galvanized
- designed for low fluid pressure drop
- sloping tubes for free drainage

13. CLOSE COUPLED CENTRIFUGAL PUMP
- completely piped from the suction strainer to the water distribution system (on coil products only)

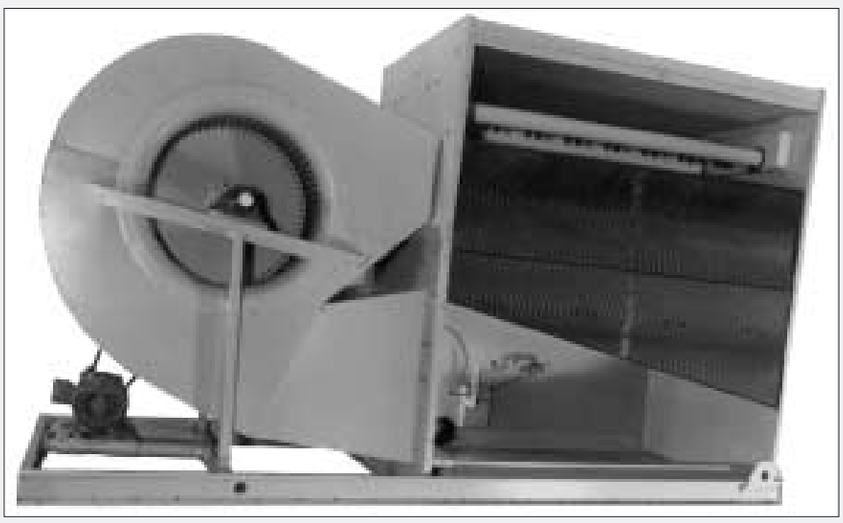

Figure 2. Model VTL Cooling Tower

Warnings

- **WARNING:** 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:** 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.
- **WARNING:** Openings and/or submerged obstructions may exist in the bottom of the cold water basin. Use caution when walking inside this equipment.
- **WARNING:** The top horizontal surface of the unit is not intended to be used as a walking surface or working platform. If access to the top of the unit is desired, the purchaser/end-user is cautioned to use appropriate means complying with applicable safety standards of governmental authorities.
- **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. Contact your local BAC Representative regarding any such applications. Additionally, inverter duty motors are required on installations that are to be controlled by VFDs.
- **WARNING:** The basin heater is not designed to prevent icing during unit operation.

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. Described in this manual are the recommended services for start-up, operation, and shutdown, and the approximate frequency of each.

Freeze Protection

These products must be protected against damage and/or reduced effectiveness due to possible freeze-up by mechanical and operational methods. Please refer to the Cold Weather Operation guidelines or contact the local B.A.C. representative for recommended protection alternatives.

Safety Precautions

- All electrical, mechanical, and rotating machinery constitute a potential hazard, particularly for those not familiar with its design, construction, and operation. Accordingly, adequate safeguards (including use of protective enclosures where necessary) should be taken with this equipment both to safeguard the public (including minors) from injury and to prevent damage to the equipment, its associated system, and the premises.
- Depending upon site conditions, it also may be necessary to install ladders, safety cages, stairways, access platforms, and handrails and toeboards for the safety and convenience of authorized service and maintenance personnel.
- At no time should this equipment be operated without all fan screens, access panels, and access doors in place.
- The operation, maintenance, and repair of this equipment should be undertaken only by personnel qualified to do so. All such personnel should be thoroughly familiar with the equipment, the associated system and controls, and the procedures set forth in this manual. Proper care, procedures, and tools must be used in handling, lifting, installing, operating, maintaining and repairing this equipment to prevent personal injury and/or property damage.
- The recirculating water system may contain chemicals or biological contaminants, including Legionella, which could be harmful if inhaled or ingested. Accordingly, personnel who may be 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 should these be used to clean portions or components of the recirculating water system, must wear respiratory protection equipment approved for such use by the local occupational safety and health authorities

General Maintenance Information

The services required to maintain a piece of evaporative cooling equipment are primarily a function of the quality of the air and water in the locality of the installation:

- **AIR:** The most harmful atmospheric conditions are those with unusual quantities of industrial smoke, chemical fumes, salt, or heavy dust. Such airborne impurities are carried into the equipment and absorbed by the recirculating water to form a corrosive solution.
- **WATER:** The most harmful conditions develop as water evaporates from the equipment, leaving behind the dissolved solids originally contained in the make-up water. These dissolved solids may be either alkaline or acidic and, as they are concentrated in the circulating water, can produce scaling or accelerated corrosion.

The extent of impurities in the air and water determines the frequency of most maintenance services and also governs the extent of water treatment which can vary from a simple continuous bleed and biological control to a sophisticated treatment system.

Recommended **Maintenance** Service

Type Service	Start-Up	Monthly	Every 6 months	Shut-down	Annually	Ref Page
Inspect general condition of the unit	✓	✓				
Clean Debris from Unit	✓	✓		✓		
Clean and Flush Sump	✓	✓		✓		
Clean Sump Strainer	✓	✓		✓		
Check and adjust Sump Water Level	✓	✓				
Inspect Heat Transfer Section	✓	✓				
Inspect Spray Nozzles	✓	✓				
Check and Adjust Fan Belt Tension	✓	✓				
Check and Adjust Bleed Rate	✓	✓				
Check Operation of Make-Up Valve	✓	✓				
Check Unit for Unusual Noise or Vibration	✓	✓				
Check Fan Bearing Locking Collars	✓		✓			
Check Motor Voltage and Current	✓		✓			
Lubricate Fan Shaft Bearings	✓		✓	✓		
Lubricate Motor Base Adjusting Screw	✓		✓	✓		
Check Fan for Rotation Without Obstruction	✓					
Check Fan and Pump Motor for Proper Rotation	✓		✓			
Drain Sump and Piping	✓					
Inspect Protective Finish	✓			✓		

Table 1. Recommended Maintenance Services for Low Profile Series V Equipment

WARNING: 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 and tagged out.

NOTES:

1. **Recommended service intervals are the minimum for typical installations. Different environmental conditions may dictate more frequent servicing.**
2. **When operating in ambient temperatures below freezing, the unit should be inspected more frequently.**
3. **Tension on new belts must be readjusted after the first 24 hours of operation and quarterly, thereafter.**

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LOW PROFILE SERIES V

Operation and Maintenance

Initial & Seasonal Start-Up

Before initial start-up or after a long shut-down period, the unit should be thoroughly inspected and cleaned:

1. Clean any debris from inlet air screens, fans, eliminators, heat transfer sections and cold water basin.

2. Flush the cold water sump (with sump strainers in place) and drain to remove accumulated dirt.

3. Remove, clean and replace sump strainers.

4. Turn the fan by hand to ensure rotation without obstruction.

5. Check the locking collar on each fan bearing assembly and tighten as required.

6. Check and, if necessary, adjust the fan belt tension.

7. Prior to seasonal start-up, lubricate the fan shaft and motor bearings. The ball bearings are factory lubricated, but should be relubricated if the unit has been sitting on site for more than a year before start-up.

8. Check float operated make-up valve to be sure it is operating freely.

9. Fill cold water sump with fresh water to the overflow level.
a) At initial start-up or before restart-up where the sump was completely drained : the initial biocide treatment should be applied at this time (see Water Treatment Section).
b) Following a shut-down period, where the sump was not completely drained: it is recommended that an initial shock treatment of appropriate biocides be administered at restartup to eliminate accumulated biological contaminants.

10. Set the float on the make-up valve to shut off the valve when the float is approximately 13 mm below the overflow level.

11. On VFL Industrial Fluid Coolers and VCL Evaporative Condensers, start the pump and check for the proper rotation as indicated by the arrow on the pump cover. On installations where the unit pump was not furnished by the factory, a globe valve should be installed in the pump discharge line and the pump flow rate adjusted to correct water flow.

12. Inspect spray nozzles and heat transfer section.

13. Start the fan and check for the proper rotation as indicated by the arrow on the fan housing.

14. Check the voltage and current of all three legs of the fan and pump motors. The current should not exceed the nameplate rating. After prolonged shutdowns, the motor insulation should be checked with a megger insulation tester prior to restarting the motor. To prevent motor overload, do not operate fan motor without design water flow over unit.

15. Open the bleed line valve (must be furnished by others on cooling towers) and adjust bleed to the recommended rate (See "Water Treatment").

WARNING: 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.

CAUTION: Before performing any maintenance or inspection, make certain that all power has been disconnected and locked in the off position.

After 24 Hours

After 24 hours of operation under load, the following services should be performed:

1. Check the unit for any unusual noise or vibration.
2. Check the operating water level in the cold water sump. Adjust if necessary.
3. Readjust the fan belt tension.
4. Inspect spray nozzles and heat transfer section.

WARNING: 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.

Operation

During operation, the unit should be inspected, cleaned, and lubricated on a regular basis, as per the 'Recommended Maintenance Service Table' in this bulletin.

After 24 hours of operation under thermal load, perform the following services:

- ✓ Check the unit for any unusual noise or vibrations.
- ✓ Check the operating water level in the cold water basin.
- ✓ Adjust make-up valve if necessary.
- ✓ Check the belt tension and readjust if necessary.
- ✓ Inspect the spray nozzles and heat transfer section.

Seasonal Shutdown

The following services should be performed when the unit is to be shutdown for a prolonged period:

1. Drain the cold water sump and all piping (including spray pump) that will be exposed to freezing temperatures.

2. Clean and flush the cold water sump with the sump strainers in place. Leave the drain open so rain and melting snow will drain from the unit.

3. Clean the sump strainers and re-install.

4. Lubricate the fan-shaft and motor bearings, motor base and motor base adjusting screw.

5. Close shut-off valve in water make-up line and drain all exposed make-up piping.

6. Inspect the protective finish on the unit. Clean and refinish as required.

7. For VFL coolers only, follow the coil freeze protection guidelines explained on page 22.

CAUTION: Pressure greater than 69 kPa may cause damage to the distribution system.

WARNING: 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.

2

LOW PROFILE SERIES V

Detailed Component Maintenance Procedures

Cold Water Sump

The cold water sump should be inspected regularly. Any trash or debris which may have accumulated in the sump or on the strainers should be removed. Each month, the entire cold water sump should be drained, cleaned, and flushed with fresh water to remove the silt and sediment which normally collects in the sump during operation. If not removed periodically, this sediment can become corrosive and cause deterioration of the protective finish. When flushing the sump, the strainers should be left in place to prevent the sediment from re-entering the system. After the sump has been flushed, the strainers should be removed, cleaned, and replaced before refilling the sump with fresh water.

Make-Up Valve Assembly

A float-operated mechanical make-up valve assembly (see Figure 1) is furnished as standard on all units unless the equipment has been ordered with an electrical water level control or for remote sump application. It is located inside the unit sump within easy reach from the access door at the connection end.

The make-up assembly consists of a bronze makeup valve connected to a float arm assembly and actuated by a large diameter polystyrene filled plastic float. The float is mounted to an all-threaded rod which is held in place by wing nuts. They allow easy adjustment of the operating water level. The make-up assembly should be inspected monthly and adjusted as necessary. The valve itself should be inspected annually for leakage and the valve seat replaced if necessary.

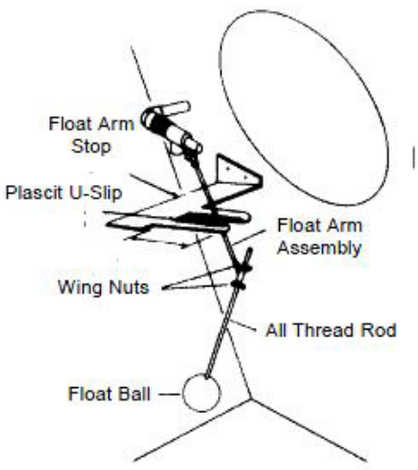

Figure 1. Water Make-Up Valve Assembly

Detailed Component Maintenance Procedures

Cold Water Sump

Make-Up Valve Assembly

WARNING: Do not use acid to clean the strainers.

WARNING: Openings and/or submerged obstructions may exist in the bottom of the cold water basin. Use caution when walking inside this equipment.

Sump Operating Level

Tabulated below are the recommended sump water operating heights for Low Profile Series VL when the circulating water is pumped directly from the cold water sump. The operation at the recommended water level will ensure that the unit sump contains sufficient water volume to prevent air entrainment in the circulating pump during system start-up and provide excess sump volume to accept the quantity of water suspended in the unit and in external system components, including piping and heat exchangers, which could drain to the unit when the circulating pump is shut down.

WARNING: 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.

Model Number	Operating Height (mm)
VTL	140
VCL	140
VFL	140

Table 2. Cold Water Basin Water Levels

To make the INITIAL sump water level setting, adjust the wing nuts so that the make-up valve is completely closed when the water level is 13 mm below the overflow connection. Under design thermal load and with average city water pressure (1 to 3.5 bar) at the valve, this setting should produce operating water levels stated in Table 2 and Figure 2.

The operating water level in the cold water sump will fluctuate with the system thermal load (evaporation rate), the bleed rate and make-up supply water pressure. It may be necessary to re-adjust the float in order to attain the recommended operating height. The unit sump should be closely monitored and water level adjusted as necessary during the first 24 hours of operation.

WARNING: 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.

During normal operation the cold water sump will contain water even if the unit is designed for remote sump operation. In these cases the water level in the pan will depend on the circulating water flow rate, outlet connection size, quantity and location, and drain piping size and configuration.

The sump operating level during remote sump operation is not adjustable.

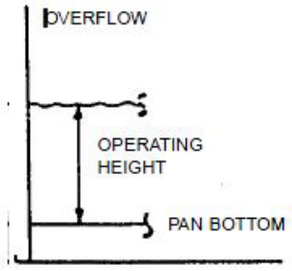

Figure 2. Operating Water Level

Electric Water Level Control

As an option, an electric water level control package is available. The package consists of an electrical level switch and a solenoid valve. The water level is maintained at the recommended operating level regardless of the system thermal load; therefore it is not necessary that the operating level be adjusted.

Fan Shaft Bearings

The fan shaft is supported at each end by ball bearings (See Figure 3), each equipped with a lubrication fitting and locking collar. Extended grease lines are fitted on all Low Profile Series VL units.

Lubrification

Under normal operating conditions, the bearings should be greased every 2.000 operating hours or at least every six months. The bearings should also be greased at seasonal start-up and shut-down.

Lubricate the bearings only with one of the following water resistant inhibited greases which are good for ambient temperatures ranging from 54°C to 120°C.

Exxon - Beacon #325
Shell - Aeroshell #7
Mobil - Mobilgrease #28
Chevron - SRI #3
American - Rycon Premium #3
Keystone - 84 EP Light

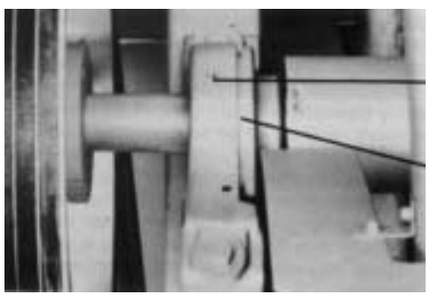

Figure 3. Ball Bearing

The bearings should be lubricated only with a hand grease gun. Do not use high pressure grease guns since they may rupture the extended grease lines or bearing seals. When lubricating, purge and the old grease from the bearing by gradually adding grease until a bead of new grease appears at the seal.

WARNING: No service work should be performed on the drive train without first ensuring the fan and pump motors have been isolated, tagged and locked in the off position.

Locking Collars

Each eccentric locking collar should be checked every six months to ensure that the inner bearing race is secured to the fan shaft. The locking collar can be set using the following procedure (See Figure 4):

1. Loosen the set screw.
2. Using a drift pin or centerpunch, tap the collar (in the hole provided) tangentially in the direction of rotation while holding the shaft.
3. Retighten the set screw.

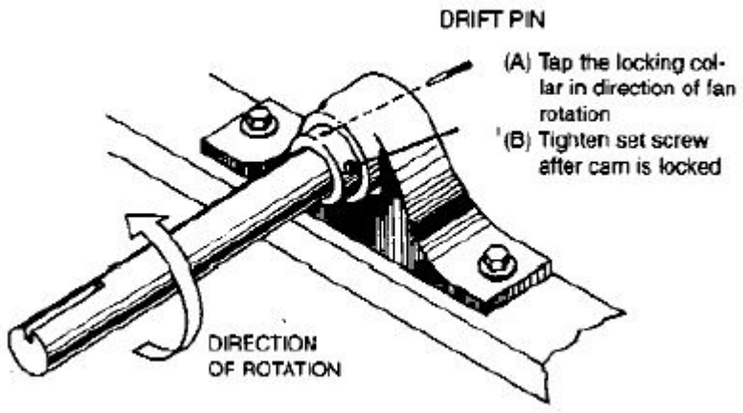

Figure 4. Locking Collar Assembly

Fan Motor Bearings

All motors have the bearings correctly charged with grease. Motors up to frame size D180 do not have external lubricators. Motors as from size D200 have lubricators and need lubrication as per motor supplier instructions Installation and Maintenance Instructions (in English) for the motors are located in the motor terminal box when the equipment ships from the factory.

Adjustable Motor Base

The motor base slides and adjusting screw (See Figure 5) should be coated twice a year using a good quality corrosion inhibiting grease, such as one of those recommended for lubrificating the fan shaft bearings.

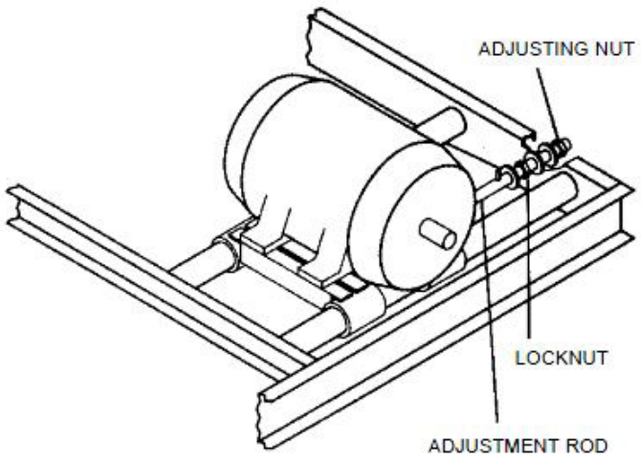

Figure 5. Adjustable Motor Base

Fan Drives

The fan BELT TENSION should be checked, if necessary adjusted, every month. The position of the fan motor can be changed to achieve this by rotating the motor base adjusting screw which extends through the bottom frame angle.

Remark: Rotate the fan sheave half a turn to evenly distribute the tension in the belt before measuring.

The belt tension is correct if following conditions are both met:

a) the deflection amounts 10 mm/m free belt length (see figure 6)
eg. the deflection is 8 mm for a free belt length of 0.8 m. the deflection is 12 mm for a free belt length of 1.2 m.

b) the deflection force required is between the min & max values given in the table herewith for the belt type & sheave size concerned.

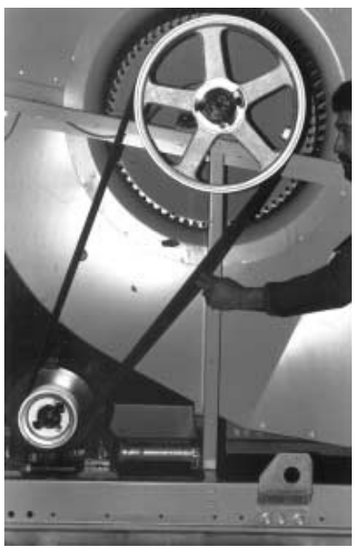

Figure 6. Fan Belt Adjustment

BELT PROFILE	DIAMETRE (mm) MOTOR SHEAVE	DEFLECTION FORCE (kg)	
		MIN	MAX
XPA	80 through 125 132 through 200 >200	1.5 2.0 2.5	2.5 3.0 3.5
SPA	100 through 125 132 through 212 >212	1.5 2.0 2.0	2.0 2.5 3.0

Table 3. Belt Tension Forces

New belts have to be retensioned after 24 hours operation.

The DRIVE ALIGNMENT should be checked annually to ensure maximum belt life. This is done by placing a straightedge across both sheaves as shown in Figure 7.

When the drives are properly aligned the gap measured between straightedge and sheave does not exceed 0,5 mm per 100 mm of sheave diameter.
Ex: motor sheave has ø 150 mm and fan sheave
has ø 500 m
Max. gap on motorsheave 1,5 x 0,5 = 0,75 mm
Max. gap on fan sheave 5 x 0,5 = 2,5 mm

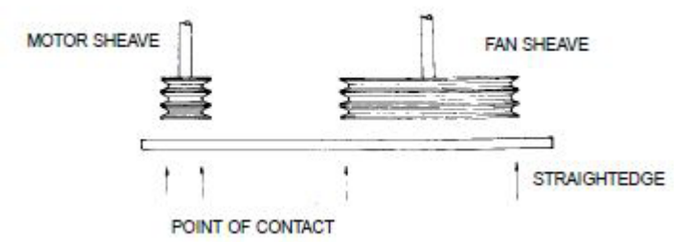

Figure 7. Checking Sheave Alignment

Spray Nozzles And Heat Transfer Section

The spray nozzles and heat transfer section should be inspected and cleaned each month. The inspection procedure is as follows :

1. Shut off the fan, but leave the pump running.
2. Remove the eliminators.
3. Check to see if the nozzles are producing the spray pattern shown in Figure 8a for cooling tower or 8b for industrial fluid coolers and evaporative condensers.
4. Clean any nozzles which are clogged. If necessary, the nozzle and rubber grommet may be removed for cleaning.
5. Inspect the coil or wet deck surface. Any corrosion, damage, or obstructions must be corrected.
6. Some VCL and VFL units are provided with an extended surface coil. During the winter season, when the ambient temperature is well below design, units with this coil can operate with the spray pump off. The coil is designed for seasonal dry operation followed by seasonal wet operation, and not for frequent cycling of the spray pump.
Frequent spray pump cycling may lead to excessive scale buildup.

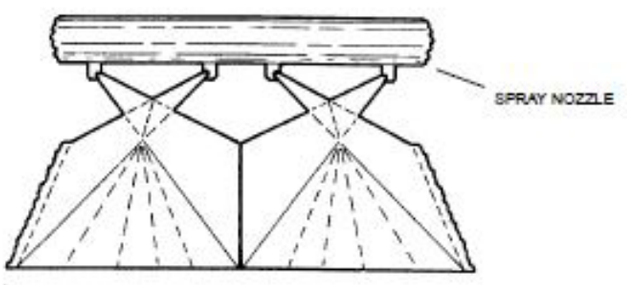

Figure 8a. Nozzle Spray Distribution (Cooling Towers)

NOTE: Do not use steam or high pressure water to clean cooling tower wet deck surface other than steel.

Corrosion Protection

All Low Profile Series VL Units are constructed entirely of corrosion resistant materials. The wet deck surface of the VTL is made of an inert synthetic material which requires no protection against rot, decay, rust of biological attack. The coils of the VCL and VFL are hot-dip galvanized after fabrication. The balance of the construction is of hot-dip galvanized steel with either Baltimore Aircoils BALTIPLUS Protection finish or the BALTIBOND Corrosion Protection System.

BALTIPLUS Protection

Once a year the steel components should be thoroughly inspected. If there are any signs of blemishes or corrosion, the affected area only should be thoroughly wire brushed and recoated. The recommended procedure is to use a base coat of ZRC (Zinc Rich Compound). The externals of the tower can be touched up with Zinc Aluminum, if necessary. Both the ZRC and Zinc Aluminum are available from your local B.A.C. Representative.

NOTE: BALTIBOND, BACOUNT and BALTIGUARD are trademarks of Baltimore Aircoil Company, which may be registered or pending in the U.S.A. and certain other nations.

BALTIBOND Corrosion Protection System

The BALTIBOND Corrosion Protection System is provided as an option on the entire unit. Scratches and scrapes can be touched up with a two-component repair kit (B.A.C. part no. RK 1057). In the unlikely event that damage is more extensive than simple scratches or dents, contact your local B.A.C. representative.

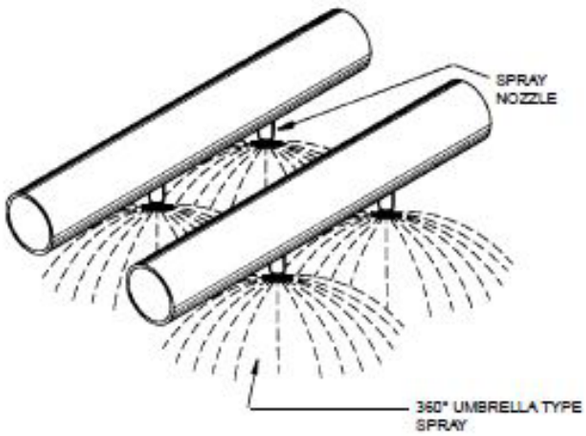

Figure 8b. Nozzle Spray Distribution (Coil Products)

3

LOW PROFILE SERIES V

Water Treatment

BLEED OFF

CHEMICAL TREATMENT

BIOLOGICAL CONTROL

Evaporative cooling is accomplished by the evaporation of a portion of water being recirculated.
As water evaporates, the dissolved solids originally present in the water remain in the system. The concentration of dissolved solids increases rapidly and can reach unacceptable levels. In addition, airborne impurities and biological contaminants are often introduced into the recirculating water.
If impurities and contaminants are not effectively controlled, they can cause scaling, corrosion, sludge or biological fouling. The Circulated Water Quality Guidelines are to be respected.
Accordingly, a water treatment program should be employed to control all potential contaminants.
While in many cases simple bleed-off may be adequate for control of corrosion, it is insufficient to control biological contamination and this subject must be addressed in any treatment program.

	BALTIBOND Corrosion Protection System	BALTIPLUS Protection
pH	6.5 à 9.0	7.0 à 9.0
Hardness as CaCO3	30 à 500 ppm	30 à 500 ppm
Alkalinity as CaCO3	500 ppm max.	500 ppm max.
Total Dissolved Solids	1200 ppm max.	1000 ppm max.
Chlorides	250 ppm max.	125 ppm max.
Sulfates	250 ppm max.	125 ppm max.

Table 4. Circulated Water Quality Guidelines

Bleed Off

To prevent an excessive build-up of impurities in the circulating water, it is recommended that a small amount of water be "bled" from the unit at a rate which is being determined by the water analysis of the make-up water and the water quality guidelines (if water analysis is not available, it is suggested to bleed at least a quantity equal to the amount of water being evaporated i.e. a rate that will maintain approximately two cycles of concentration in the circulating water). In many localities, this constant bleed and replacement with fresh water will keep the concentration of impurities in the system at an acceptable level.

NOTE: For VFL, the flow rate is the flow through the coil.

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

1. The evaporation rate is approx 1,8 l per 1000 kcam of heat rejection.
2. The evaporation rate is approximately 1,8 l per 4200 kJ.
3. Evaporate rate = Water Flow Rate (l/s) x Range (°C) x 0,0018

Example : At a flow rate of 10 l/s and a cooling range of 10°C the evaporation rate is 0,18 l/s (10 l/s x 10°C x 0,0018 = 0,18 l/s)

The rate of bleed-off can be adjusted with the valve and measured by filling a gallon container while noting the time period. The bleed-off rate should be checked periodically to ensure that proper water quality is being maintained.

Chemical Treatment

If the condition of the water is such that constant bleed-off will not control scale or corrosion, chemical treatment may be necessary. If a water treatment program is used it must meet the following requirements:

NOTE: The bleed line must be furnished by others on all cooling tower models VTL.

1. The chemicals must be compatible with galvanized (zinc coated) steel. Water treatment chemicals which are compatible with galvanized steel are also satisfactory for the Zinc Chromatized Aluminum finish.
2. Chemicals should be fed into the recirculated water, but not into the cold water sump, on a continuous metered basis to avoid localized high concentrations which may cause corrosion. These chemicals are normally fed into the pump discharge line. Batch feeding of chemicals does not afford adequate control of water quality and is not recommended.
3. Acid water treatment is not recommended for units furnished with Zinc Aluminum finish. Series VL Low Profile Units provided with the BALTIBOND Corrosion Protection System on the entire unit (designated with an "R" suffix on the nameplate, VTL-272-PR) may be used on systems with acid water treatment as long as requirement 2 and the water quality guidelines are maintained.

Biological Control

Bleed-off with or without chemical treatment for scale and corrosion control is not adequate for control of biological contamination. The growth of algae, slimes, and other micro-organisms, if unchecked, will reduce system efficiency and may contribute to the growth of potentially harmful micro-organisms, including Legionella, in the recirculating water system.

Accordingly, a treatment program specifically designed to address biological control should be initiated when the system is first filled with water and administered on a regular basis thereafter in accordance with the suppliers instructions.

Water Treatment

Bleed Off

Chemical Treatment

Biological Control

NOTE: For specific recommendations on treatment for scale, corrosion, or biological control, consult a competent water treatment supplier.

4

LOW PROFILE SERIES V

Cold Weather Operation

PROTECTION AGAINST PAN WATER FREEZING

PROTECTION AGAINST COIL FREEZING (VFL ONLY)

Low Profile Series VL equipment can be operated in subfreezing ambient conditions provided the proper measures are taken:

1. Protection against pan water freezing when the unit is idle.

2. Capacity control to prevent ice formation in heat transfer sections during operation.

3. Protection against coil freezing (VFL Industrial Fluid Coolers).

Cold weather applications should be reviewed with the B.A.C. representative in your area to ensure that the unit selection, location, control, and accessories are adequate to ensure reliable operation. Listed below are general guidelines which should be followed to minimize the possibility of freeze-up.

Protection Against Pan Water Freezing

When the unit is shutdown and exposed to subfreezing ambient temperatures, the pan water may freeze. A remote sump located in a heated indoor area is a desirable method of freeze protection. Alternatively, pan heaters (electric immersion heaters, steam coil, or hot water coil) can be used to maintain the pan water at a minimum temperature of 4°C. In addition to protecting the cold water basin, all exposed water piping including pump piping below the overflow level and make-up water lines should be traced with electrical heater tape and insulated.

Protection Against Coil Freezing (VFL only)

Evaporative Fluid Cooler coil(s) must be protected from damage by freezing of the fluid inside the coil(s) when exposed to subfreezing conditions. Freeze protection can be obtained by the use of ethylene or propylene glycol or other anti-freeze solutions in appropriate concentrations. In such cases refer to the appropriate selection method in the technical bulletins D385. When an antifreeze solution is not possible, the system must be operated to meet both of the following conditions:

1. Maintain the minimum recommended flow through the unit at all times.

VFL Minimum Flow Requirements

Model	Min Flow (l/s)
VFL 24X-48X	4.1
VFL 72X-96X	7.9

Table 5.

2. Maintain the heat load on the circulating fluid so that the temperature of the fluid leaving the coil will not fall below 10°C.

If the process load is extremely light or shut off, it may be necessary to apply an auxiliary heat load circulating fluid at 10°C when freezing conditions exist.*

Draining the coil is not recommended as a normal method of freeze protection. Frequent draining promotes corrosion inside the coil tubes. However, draining is acceptable as an emergency method of freeze protection if the coil is not protected by an antifreeze solution. The local B.A.C. representative should be consulted for guidelines on the installation of an emergency coil drain system.

***NOTE:** For evaporative chilling applications only, the leaving fluid temperature can be maintained as low as 8°C. Consult the local B.A.C. representative for necessary precautions.

Protection Against Coil Freezing

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LOW PROFILE SERIES V

Capacity Control

Capacity Control

It is necessary to prevent the recirculating water from approaching freezing conditions when the unit is operating under load.

At times the unit is provided with the BALTIGUARD Fan System for Capacity Control. A full size fan motor and drive are installed at one end of the fan shaft and a lower horsepower motor (sized at approximately one-third the horsepower of a standard motor, with drives designed for approximately 2/3 of design fan speed) is installed at the opposite end. This allows the fans to operate at 2/3 speed at lower ambient conditions. Please note that capacity control dampers allow the unit to operate longer and with closer control than the BALTIGUARD Fan System and/or fan cycling. Units with two-speed motor or the BALTIGUARD Fan System should have a 15 second time delay during switch down from high to low speed to avoid overloads on the low speed windings or motor.

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LOW PROFILE SERIES V

Factory Authorised Parts

Factory Authorised Parts

Baltimore Aircoil maintains a stock of replacement parts at each of its manufacturing facilities.
Shipment of these parts is normally within four days after receipt of an order. In emergency situations, shipment can usually be made within twenty-four hours. To order factory authorized parts, contact your local Baltimore Aircoil representative. Be sure to include the unit serial number when ordering any parts.

To facilitate servicing the unit, it is suggested that the following parts be carried on hand:

- Make-Up Float Ball
- Valve Seat for Make-Up Valve
- Fan Shaft Bearings
- Fan Wheel
- Fan Belts
- Spray Nozzles and Grommets
- Spray Distribution Branch Grommet
- Access Door Gasket
- Spray Pump (for VCL & VFL)

COOLING TOWERS

CLOSED CIRCUIT COOLING TOWERS

ICE THERMAL STORAGE

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PARTS & SERVICES

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