# AIR HANDLING
# EVAPORATIVE COOLING SYSTEMS

## "BUILDING FOR PEOPLE"


**BARNHART / TAYLOR**
**INCORPORATED**

1602 E. Yandell Dr.
El Paso, TX 79902
Ph: (915) 533-1231
Fax: (915) 533-8942

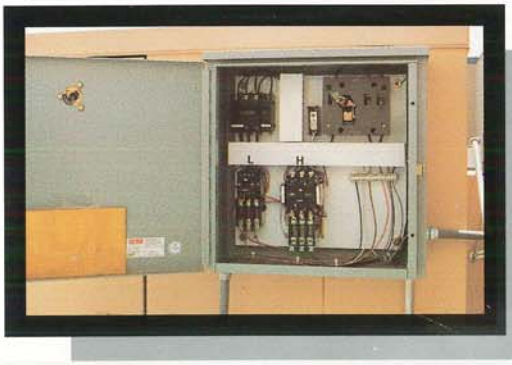
www.barnharttaylor.com

Sizes manufactured to date range from 1,000 to 80,000 CFM. Products currently available include:

PENTAIRE SERIES

Evaporative Coolers with standard features that make this series our top of the line.

INFINITY SERIES Evaporative Coolers with standard and optional features that offer excellent performance and value.



XCELL SERIES

Two stage Evaporative Coolers that rival or exceed the competition's performance and durability.

TEMPTITE SERIES

Packaged Rooftop units include gas fired furnaces and Evaporative Cooling modules for 100% make-up air or return air applications.

SMARTZONE SERIES

Standard and custom designed and built air handling units with hot and chill water coils.

NAUTICA SERIES

Small to midsize Evaporative Coolers for the residential and commercial market will be available in spring of 1996.

Specifications, drawings and additional information can be found in our product catalog. Or simply give us a call with your requirements for custom applications.

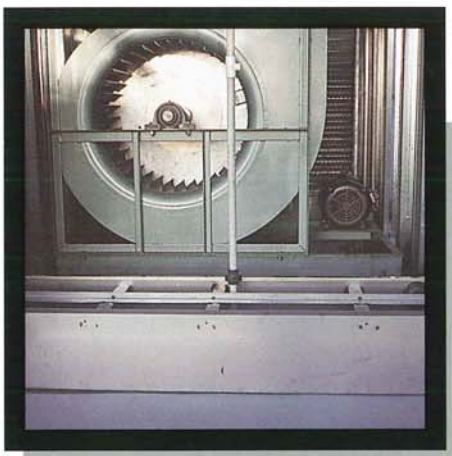
BARNHART-TAYLOR INC. is in it's 6th year of operation in 1994, as an Original Equipment Manufacturer of Air Handling and Evaporative Cooling Equipment.

Our goal from the very beginning has been to produce high quality units to be sold in Mexico and the United States that will provide years of low maintaince service at competitive prices.

Since 1991 Interclimas™ in association with Barnhart-Taylor Inc. has manufactured the high quality units our customers have come to expect.

Hundreds of Air Handlers and Evaporative Coolers are operating in both the United States and Mexico.

Our customers vary from large corporations such as ESSEX INTERNATIONAL, where the first Pentaire Series Evaporative Coolers were installed, to Military Bases such as Ft. Bliss where the XCELL SERIES two stage Evaporative Coolers have been in operation for four years.



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# BARNHART/TAYLOR
## INCORPORATED
# STANDARD WARRANTY

All parts are warranted for a period of one year after start-up or acceptance of the equipment or 15 months from date of delivery, which ever comes first. Transportation costs of parts to El Paso, and all labor costs to remove and replace the part are to be the purchaser's responsibility.

We will guarantee our equipment to be first class in every respect as to workmanship and material. Should any item manufactured by BARNHART-TAYLOR,INC. prove defective within the above warranty period due to faulty material or improper workmanship, we will furnish, without charge to the purchaser, replacement or repair of said defective part or parts. On items not of our manufacture, the manufacturer's warranty is extended to the purchaser. Defective parts must be returned to BARNHART-TAYLOR,INC.

Celdek media will not be warranted if bleed rates are not properly set. Failure to establish proper bleed rates can damage media and impair performance.
In the interest of product improvement BARNHART-TAYLOR INC. reserves the right to make changes without prior notice.

ENGINEERING / SALES OFFICE:

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Brochure by SILVA IMAGING, El Paso, Texas (915) 821-7491

# ***BARNHART-TAYLOR, INC.***

## General Evaporative Cooling Unit Operation and Maintenance Instructions

**SAFETY:**

Safety is a factor that must be considered at all times in the operation and maintenance of mechanical equipment. Use of proper tools and methods can prevent accidents that may result in injury to you and your fellow workers.

A number of safety precautions are listed throughout this manual. Study them carefully and follow them; insist that those working with you do the same. Remember, an accident is usually caused by carelessness or negligence.

Only authorized and trained persons completely familiar with installation, operation and prescribed maintenance procedures should be allowed to work on your unit.

Failure to observe the precautions outlined may result in damage to the equipment and serious personal injury.

Before performing any maintenance: **LOCK OUT POWER**

1. **ALWAYS** operate unit in accordance with instructions in this manual.

2. **NEVER** bypass or jumper electrical components.

3. **NEVER** operate equipment without all service entry doors securely fastened.

**CAUTION**: NEVER SMOKE OR HAVE AN OPEN FLAME INSIDE OR NEAR THE UNIT. WHEN THE MEDIA IS DRY, IT IS HIGHLY FLAMMABLE. USE EXTREME CAUTION WHEN COMPARTMENT DOORS ARE OPENED FOR MAINTENANCE.

**SET BLEED RATES:**

Water always contains a certain amount of dissolved minerals. When evaporation takes place, the mineral concentration in the recirculated water will increase in the sumps. To avoid build-up of mineral scale on the cooling media, some of the recirculated water must be discharged or “BLED-OFF” and replaced with fresh water.

**WARNING**: MINERAL SCALE BUILD-UP WILL CAUSE INCREASED PRESSURE DROPS ACROSS COOLING SURFACES AND WILL DAMAGE MEDIA.

**VIBRATION:**

Excessive fan vibration is the most common unchecked problem that occurs during start-up and operation of the units. Left unchecked, excessive vibration can cause a multitude of problems, including structural and component failure. The most common cause of fan vibration is:

1. Wheel imbalance
2. V-Belt drive misalignment
3. Improper belt tension
4. Faulty or worn belts
5. Bearing misalignment
6. Mechanical looseness

Many of these conditions can be discovered by careful observation during scheduled maintenance checks. At the time of the scheduled maintenance the fan should be cleaned of dirt accumulation on the wheel and the housing to prevent imbalance. All fasteners should be checked for tightness and V-belt drives checked for alignment, tension and wear.

**V-BELT DRIVES:**

V-belt drives must be checked on a regular basis for wear, tension, alignment, and accumulation of dirt. Belt failures are frequently caused by improper belt tension, (either too loose or too tight) or misaligned sheaves. Abnormally high belt tension or drive misalignment will cause excessive bearing loads and may result in failure of the fan and/or the motor bearing. Conversely, loose belts will cause squealing on start-up, belt flutter, slippage, and overheated sheaves. Either excessively loose or tight belts may cause fan vibration.

When replacing V-belt on multiple groove drives, all belts should be changed at the same time and as a matched set. This will insure uniform drive loading. Do not install belts on worn sheaves. If the sheaves have grooves worn in them, the sheaves must be replaced before new belts are installed.

Remember, V-belt drives have been carefully selected for this unit's specific operating condition. Changing V-belt drive components could result in an unsafe operating conditions and failure of fan componentry.

## ROUTINE MAINTENANCE:

A preventive maintenance program is the best way to spot trouble before it happens. To avoid unnecessary expense and inconvenience, a qualified serviceman on a regularly scheduled basis should inspect your evaporative cooling unit. A routine maintenance program should cover the following items:

1. Check fan alignment and vibration.
2. Tighten all fan fasteners as required.
3. Lubricate motor and fan shaft bearings.
4. Align or replace V-belts as needed.
5. Tighten V-belts as required.
6. Flush water distribution system.
7. Insure the sump drains are not blocked.
8. Insure that scale is not forming on media.
9. Insure pumps are at proper water level submergence while in operation.
10. Check power and control voltages.
11. Check running amperage.
12. Clean and treat media during shut-downs.
13. Examine and check optional equipment per manufacture’s recommendations.
14. Clean unit of accumulated operating debris.
15. Inspect all interconnects (piping, ducts, etc.) for leaks or damage.

## MAINTENANCE AND SERVICE INFORMATION:

## DAMPERS (If included in the unit):

Control dampers should be inspected as part of the maintenance program. The actuator should drive the blades from open to close and should stop as the damper seals.

## FANS:

**GENERAL**: Units are equipped with forward curve centrifugal type fans, it is important to insure that the fans are frequently inspected and maintained at regular intervals, since they are the primary component of your evaporative cooling unit. The following information should be completely understood by your maintenance personnel and followed during maintenance.

**WARNING**: BEFORE SERVICING FANS, SECURE TO THE "OFF POSITION "ALL ELECRITCAL DEVICES AND CONTROLS. FAILURE TO COMPLY WITH THIS SAFETY PRECAUTION COULD RESULT IN PERSONAL INJURY OR DEATH.

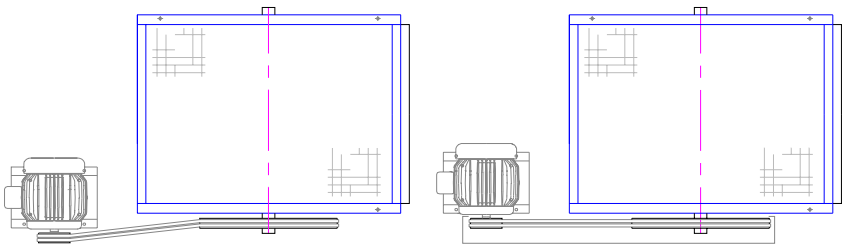
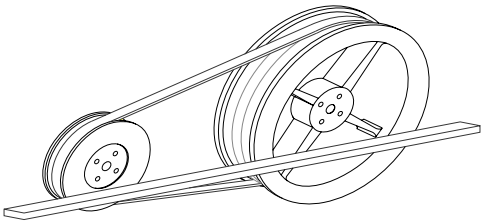



Figure 2

If V-belt drive is misaligned or being replaced adjust drive as follows:

1. Loosen belt tension so that sheaves can be adjusted.
2. Insure that fan and motor shafts are parallel as in figure 2.
3. Loosen setscrews so that the sheaves may slide freely on the shaft.
4. Re-align fan sheave and motor sheave with a straight edge, as in figure 3.



Alighting Sheaves with a straight edge
Figure 3

5. Retighten setscrew fasteners on sheaves assuring alignment is maintained.

6. Snug belts by adjusting motor base. While tensioning belts, insure that fan shaft and motor shaft remain parallel.

7. Rotate fan shaft by hand approximately 50 revolutions to allow belts to set in sheaves.

8. Adjust belt tension to proper setting as follows:

**INSTRUCITONS TO PROPERLY TENSION BETLS**

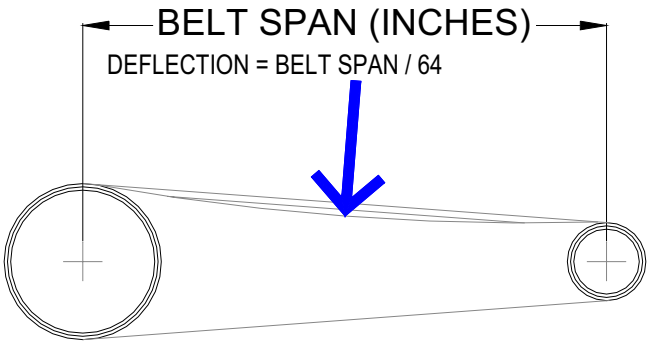



Figure 4

**FAN SHAFT BEARINGS:**

Fan shaft bearings are carefully selected to match the maximum load and operating conditions of your evaporative cooling unit. Their reliability depends on proper installation, lubrication and maintenance. The following general points of installation and operation are very important.

1. CLEANLINESS-Keep dirt, water and foreign materials off all parts.

2. CAREFUL HANDLING-Hammer blows or improper use of force can damage parts.

3. MOUNTING BOLTS-Mounting bolts must be properly tightened to prevent bearing from shifting during operation.

4. SETSCREWS-Setscrews must be properly torqued to prevent shaft from slipping in the inner race during operations.

5. LUBRICATION- A bearing not properly lubricated can run to destruction and possibly cause damage to other components.

Fan bearings are pre lubricated and required no additional lubricant at start-up. As a precaution, if the bearings are left idle for any long period of time either prior to start-up or during extended shut downs, the bearings should be purged with new grease prior to operation. **ALWAYS ADD GREASE SLOWLY**. Rapid application of grease could damage the seals and allow the grease to escape and cause the bearing to fail.

Bearing lubrication is required on a regularly scheduled basis and the interval for republication depends on the R.P.M. of the fan shaft, bearing size, operating temperature and environment. If unusual environment conditions exist (temperatures below 32 f or above 200 f, moisture or contaminants) more frequent lubrication is required.

Only use high quality lithium base grease conforming to NLGI grade 2 consistency, such as those listed below:

| | |
|---|---|
| **MOBIL 532** | **TEXACO MULITIFAK #2** |
| **MOBILUX #2** | **TEXACO PREMIUM RB** |
| **SHELL ALVIA #2** | **UNIREX N2** |

When lubricating and greasing bearings, use a sufficient volume to purge the bearing seals of old lubricant. It is preferable to rotate fan shaft by hand during republication where good safety practice permits.

Bearings operating over a period of time may develop deposits of lubricate varnish and external contaminants that may detrimentally affect bearing performance. Such

deposits of contaminants should be removed at the time of relubrication to insure against accumulation.

**FAN MOTORS:**

Motor maintenance is generally limited to cleaning and lubrication. Cleaning should be limited to the exterior surfaces only. Motors should be kept clean of grease, dirt and dust. Accumulation of contaminates forms a layer of insulation causing the motor to run hot which may cause the motor to overload and trip. Overheating also reduces the service life of the bearings. Maintenance personnel should always clean the motor during scheduled lubrication intervals.

**DIRECT MEDIA:**

The long life of the media requires a degree of preventive maintenance, observation and water that has low concentrations of mineral and chemical impurities. Problems in most circumstances can be controlled by bleed-off. Make sure the media is installed properly with the 45° flutes facing down and towards the airflow as shown in figure 5.

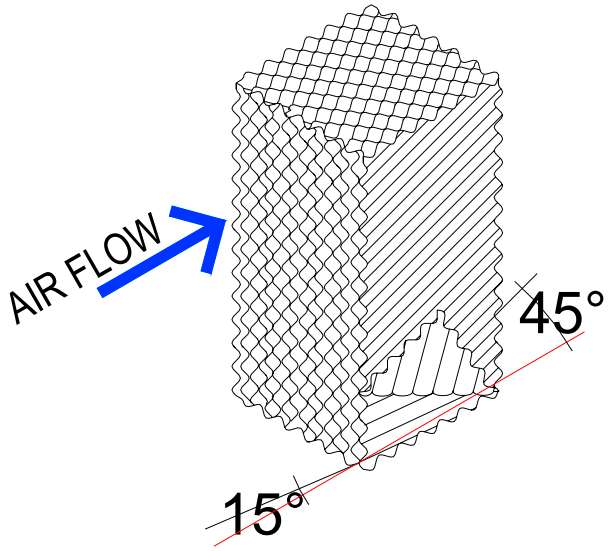



**Figure 5**

**MAINTENANCE INSTRUCTIONS:**

**REPLACEMENT OF DIRECT MEDIA (MUNTER'S CELDEK) – REFER TO FIGURE 6.**

1. Allow direct media to dry.

2. Disconnect the discharge piping from the submersible pump through the union installed right after the pump's discharge. Also remove the ½" piping

that is connected to the DWYER flow meter. This will clear the area in front of the media.

**Wet Section Detail**

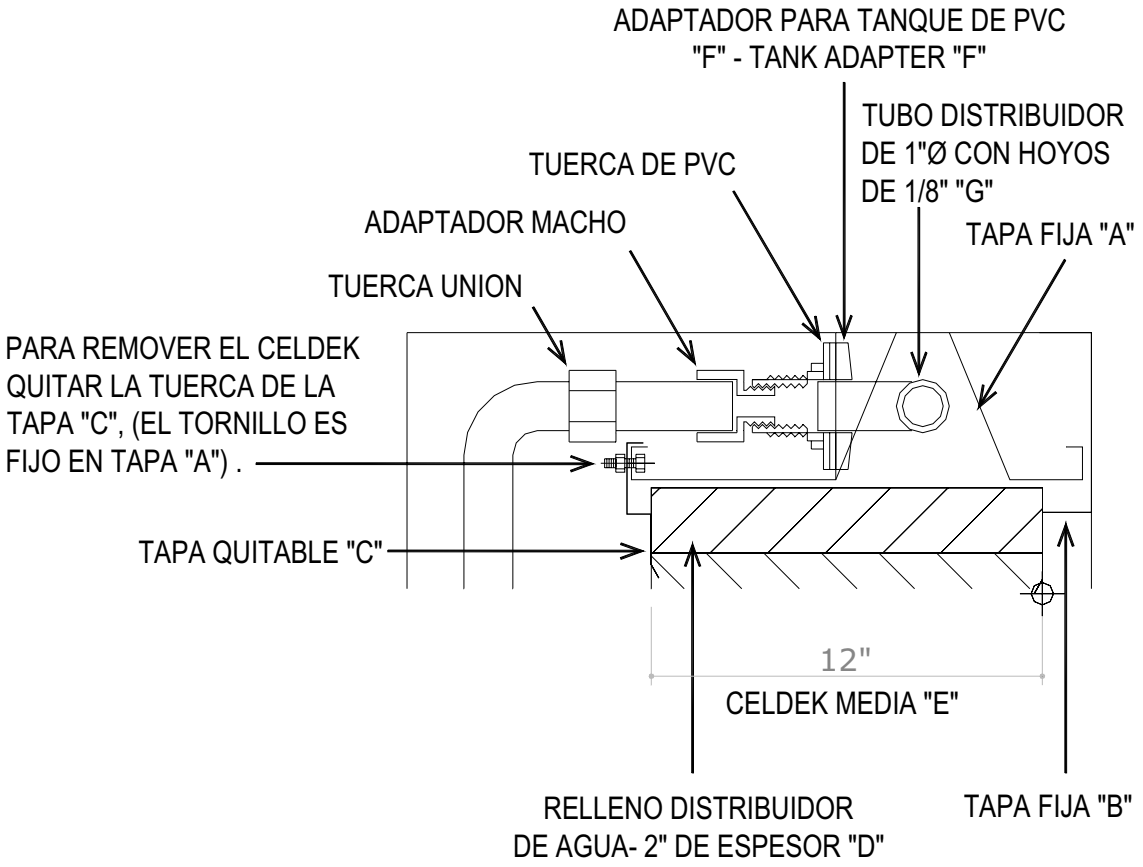



**Figure 6.**

**For replacement of the evaporative cooling media part "E" per figure 6**

3. Replacement of the direct media is accomplished by removing the ¼" stainless steel nuts which bolts down cover plate "C". The ¼" bolts are fixed to cover plate "A" which permits cover plate "C" to be removed after the nuts are removed.

**NOTE**: Cover parts "A" and "B" are fixed and are not removable.

After removal of cover plate “C” the upper portion of the evaporative media “E”, Munters Celdek, and the 2” distributor pad “D” are exposed. Slide out the pad “D” towards you which leaves a 2” gap between cover plate “B” and media “E”.

Slide your hand into the top portion of media “E” and pull media “E” towards you one at a time. Most units will have 12” thick x 12” wide media “E” with varying lengths (72” height is typical for most units).

**REPLACEMENT OF MEDIA:**

Follow the above procedure in reverse to install the new direct media. Make sure to reconnect the pump and bleed flow meter after the stainless steel cover plate is installed, and the four nuts are tightened.

**REMOVAL OF 1” DISTRUBUTOR PIPING “G”**

1. Removal of 1” distributor piping above the 2” distributor pad “D” may be accomplished as follows: (refer to figure 6 on page 10).

   Loosen the union to remove the piping in front of the evaporative media “E”. Next, unscrew the male adapter attached to tank adapter “F”. This tank adapter “F” is attached to fixed cover plate “A” by a large PVC nut, which also compresses a neoprene gasket.

   Utilizing large channel-lock pliers unscrew the plastic nut and remove the neoprene gasket. The tank adapter is now free for removal. Before removing the tank adapter, loosen the 1” distributor pipe “G” by snapping open with a flat screwdriver the plastic clamps that hold item “G”.

   The tank adapter is now ready to be removed. Through the inside of the fixed cover plate “A”, pull down at angle item “G” which is attached to item “F”. This removes the entire water distribution system and you are able to see how item “G” is fabricated.

2. Cleaning of the item “G” water distribution header is accomplished by removing the threaded pipe caps at each of the header. Flush out each header with water from a hose and unclog each 1/8” hole with a nail or other rod smaller than 1/8” diameter.

4. Larger units may have more than one distributor assembly. Repeat the above process for each assembly to assure that all piping is clear from debris and scale build up.

## CLEANING BASKET STRAINER / FILTER ASSEMBLY IN RECIRCULATION PIPING

All units incorporate one basket strainer / filter above each pump's discharge piping. Clean the stainless steel screen inside each basket strainer. The screen can be accessed by unscrewing by hand the basket portion of the strainer. Flush out the screen with soap and water and replace. Make sure the gasket is lined-up properly before screwing-in the basket by hand.

## BLEED – COMMENTS, OPINIONS AND RECOMMENDATIONS

Barnhart-Taylor's experience concerning methods for bleeding water from our evaporative coolers leads us to highly recommend the use of automatic flush systems utilizing pumps or valves activated by timers or conductivity meters. Timed flush should save about 25% of continuous bleed rates listed below.

An example would be setting the timer on a 40,000 CFM unit to activate a pump or valve to flush 20 gallons per minute for 5 minutes.

Conductivity meters set to flush the sump at intervals that maintain 3 cycles of concentrations is probably the best method but this method required the highest initial expenditure.

Weekly inspections of the back part of the evaporative cooling media for scale build-up gives a good indication for increasing or decreasing bleed rates from automatic flush systems or continuous bleed systems.

## SETTING CONTINUOUS BLEED RATES:

Our experience has been that the initial setting of the bleed rate should follow the following guideline. Depending on the make –up water dissolved solids concentration, the rate should be adjusted higher or lower.

Barnhart-Taylor prefers a simple method of setting continuous bleed rates in lieu of in line meters that tend to plug up and require maintenance. A needle valve is installed in the bleed piping, followed by vinyl tubing that drains to the unit's overflow drain. This

tubing is flexible and not connected to the overflow drain and may be used to measure the amount of bleed with a 1 or 5 gallon bucket and a watch.

It might seem crude, but this is a simple way to set, maintain and verify continuous bleed rates.

The following continuous bleed rates work well for the El Paso, Texas / Ciudad Juarez, Chihuahua, Mexico areas:

**Formula:** Bleed rate gallons per Hour = air flow rate (cubic feet per minute) / 1000

Note: Refer to technical data provided by Munters for calculating the water evaporation rates listed below. The formula utilized below for estimating the evaporation rate = 1.2 x CFM x 30F (differential dry bulb temperature of air entering the media and air exiting the media) / 10000. Adjust the differential temperature for your area.

**Examples:**

| CFM | BLEED RATE GPH | Water Evaporated -GPH |
|---|---|---|
| 15,000 | 15 | 54 |
| 20,000 | 20 | 72 |
| 25,000 | 25 | 90 |
| 30,000 | 30 | 108 |
| 35,000 | 35 | 126 |
| 40,000 | 40 | 144 |
| 45,000 | 45 | 162 |
| 50,000 | 50 | 180 |
| 55,000 | 55 | 198 |
| 60,000 | 60 | 216 |
| 65,000 | 65 | 234 |
| 70,000 | 70 | 252 |
| 75,000 | 75 | 270 |
| 80,000 | 80 | 288 |

**End of Section**

02-Mayo-06

INTER CLIMAS
AIRE, CALEFACCION Y VENTILACION

BARNHART/TAYLOR
INCORPORATED

# RECOMENDACIONES PARA UN OPTIMO FUNCIONAMIENTO DE LAS UNIDADES DE AIRE EVAPORATIVC

□ REVISAR EQUIPO ROTATORIO POR VIBRACION CADA 15 DIAS.

□ PROGRAMAR LA ENGRASADA DE CHUMACERAS DE VENTILADORES DE AIRE Y DE MOTORES ELECTRICOS COMO LO RECOMIENDA LOS FABRICANTES DE LAS CHUMACERAS.

□ LAS UNIDADES DEBEN ESTAR PROTEGIDAS CONTRA LA DUREZA DEL AGUA. EL AGUA DEBE ESTAR TRATADA A EL PUNTO QUE LOS SOLIDOS DISUELTOS EN EL AGUA SEAN CONTROLADOS.

□ TENER LA MENOR SALINIDAD POSIBLE EN LAS TUBERIAS PARA EVITAR LA CORROSION.

□ REVISAR QUE LA VALVULA DE FLUJO DE AGUA HACIA LA IRRIGACION DEL CELDEK ESTE OPERANDO ADECUADAMENTE. PARA VERIFICAR LA POSICION CORRECTA DE LA VALVULA HAY QUE OBSERVAR QUE EL CELDEK ESTE HUMEDO Y QUE NO HAYA ESCURRIMIENTO VISIBLE DE AGUA EN EL PANEL DE CELULOSA PARA EVITAR EL ARRASTRE DE GOTAS EN EL INTERIOR DEL GABINETE. HAY QUE ESPERAR 10 MINUTOS PARA COMPROBAR SU FUNCION ADECUADA.

□ LIMPIAR PERIODICAMENTE EL FILTRO DE AGUA. ES NECESARIO LIMPIAR EL CEDAZO INTERNO LIBERANDOLO DE MATERIALES SOLIDOS Y SALITRE. SI HAY DIFICULTAD PARA RETIRAR MATERIALES EN EL CEDAZO OPUESTO SE RECOMIENDA REEMPLAZAR EL FILTRO DE AGUA.

□ REVISAR FILTROS DE AIRE CADA MES PARA EVITAR QUE SE SATUREN DE TIERRA Y MANTENER EL FLUJO DE AIRE CONVENIENTE. (SI APLICA)

□ LOS FILTROS PRIMARIOS O DE ALUMINIO SON LAVABLES CON AGUA A PRESION. (SI APLICA)

□ LOS FILTROS SECUNDARIOS O DESPLEGADOS SON DESECHABLES. ESTOS TIENDEN A SATURARSE DE POLVO Y/O TIERRA Y AL REEMPLAZARLOS SE EVITA QUE LA PRESION DEL AIRE LOS PERFORE O MUEVA DE SU POSICION. (SI APLICA)

□ AL DARLE MANTENIMIENTO EN EL INTERIOR DEL GABINETE SE DEBE RETIRAR TODOS LOS CONSUMIBLES COMO CELDEK Y FILTROS DE AIRE, DE ESTA MANERA SE LIMPIA TOTALMENTE EL INTERIOR REMOVIENDO PARTICULAS SOLIDAS COMO SALITRE Y TIERRA. NO USAR AGUA A PRESION PARA LA LIMPIEZA DE LA UNIDAD, UTILIZAR TRAPOS O ESPONJAS.

□ EN CASO DE QUE LA PINTURA EPOXICA SE COMENZARA A DESPRENDER A CAUSA DE UN GLOPE O RASPADURA SE DEBE DE RETOCAR EN LOS LUGARES AFECTADOS PARA EVITAR CORROCION.

□ REVISAR EL AJUSTE DE BANDAS. EN CASO DE UN DESGASTE EXCESIVO SERA NECESARIO REEMPLAZARLAS Y VERIFICAR QUE TENGA 1" DE TENSION AL INSTALAR LAS NUEVAS.

□ AL LIMPIAR EL CELDEK SE DEBE DE USAR UN CEPILLO DE CERDAS SUAVES PARA REMOVER EL EXCESO DE SOLIDOS. (NOTA: NO UTILIZAR QUIMICOS PARA SU LIMPIEZA)

□ POR NINGUN MOTIVO APLICAR IMPERMEABILIZADOR EN LOS EQUIPOS MECANICOS COMO: MOTORES, RUEDAS DE LOS VENTILADORES DE AIRE Y POLEAS. ESTO AFECTA EL BALANCEO Y FUNCIONAMIENTO.

QUEDANDO POR ENTENDIDAS LAS RECOMENDACIONES CITADAS POSTERIORMENTE PARA UN OPTIMO MANTENIMIENTO DE LOS EQUIPOS Y RECONOCIENDO QUE EN EL CASO DE NO DARLE SEGUIMIENTO A LOS PUNTOS YA MENCIONADOS, LAS EMPRESAS INTERCLIMAS DEL NORTE S.A. DE C.V. Y BARNHART / TAYLOR, INC NO ASUMEN NINGUNA RESPONSABILIDAD.

A T E N T A M E N T E

Arq, Jorge J. Ramos Gutierrez.

E N T E R A D O