

INDUCED DRAFT COUNTER-FLOW COOLING TOWERS



CLASSIK... Taking Quality and Service to a Higher Level

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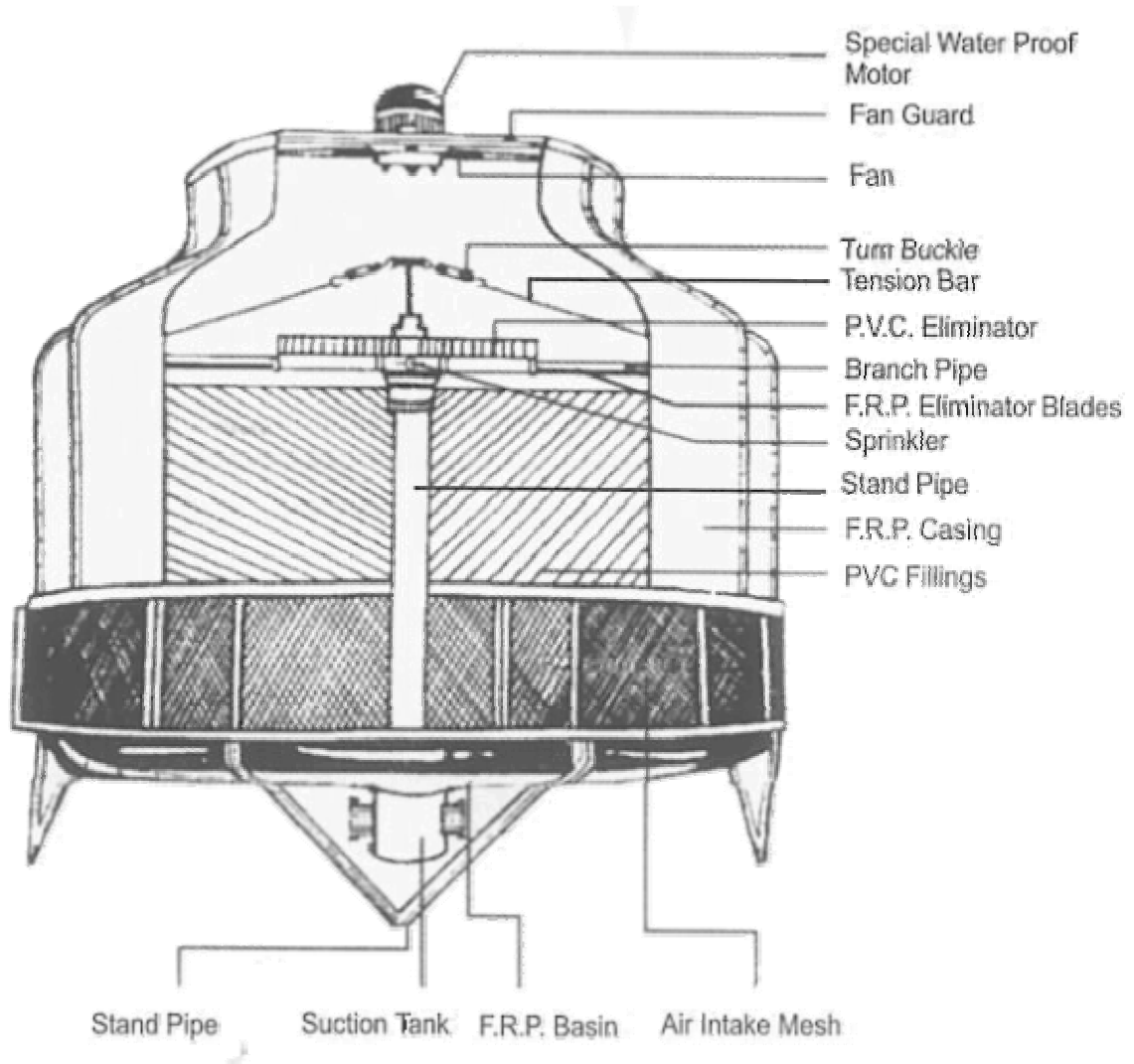
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SCHEMATIC DIAGRAM WITH SPARES



TECHNICAL SPECIFICATIONS ABOUT CLASSIK PRODUCTS

FIBRE GLASS REINFORCED PLASTIC COOLING TOWER: Fibreglass Cooling Towers have evolved out of conservative design, appropriate material selection employing fibreglass reinforced plastics and vacuum formed PVC sheet profiles. These materials eliminate the maintenance problems encountered on wooden cooling towers.

DESIGN : The distinguishing features of our product are compact design Honeycomb type PVC fills to provide maximum heat transfer surface per unit volume directly driven fan 'Minimum drift Losses' Uniform distribution of hot water by rotating arm sprinkler Non – Corrosive aluminium alloy blades or fan storage capacity of sump enhanced Hot dip galvanized hardware Bottle shaped profile to withstand wind forces ideal for terrace installations.

CAPACITY : From 5 to 500 Ref tonnes we can design and cooling towers to meet your specific requirements.

PVC FILL : This type of fill media provides an excellent solution to all prime requirements of a biological fill system and in particular, provides a large effective surface area with minimum tendency to plugging.

The fill serves as a carrying medium for the biomass and favours a uniform growth of biological slime due to its regular structure. The bacteria available utilize the organic pollution to form a growth of cellular substances. Non settable colloidal and dissolved transformed into settable biomass. The double folding enhances the materials stability.

CASING : The tower casing is made of tough fibreglass reinforced plastic (FRP) and has sufficient structural strength to withstand high wind velocities and vibrations. It is resistant to local impacts and even if slight damage occurs, local repairs can easily be done. The portion of casing housing fill and eliminator has a round cross section. The water collection sump, also of FRP, is leak proof & avoids water spillage.

SPRINKLER : The rotary sprinkler distributes the hot water uniformly over the PVC fills. This sprinkler rotates by self-propulsion and eliminates the need for atomizing the water through nozzles. The rotary head is made of aluminium with sealed ball-bearing requiring minimum maintenance.

FAN : The fan is made of cast aluminium alloy, with a lightweight rotor at the center and aerodynamically designed blades. The fan with variable pitched blades is dynamically balanced for low vibration and high efficiency.

FAN MOTOR : The fan motor is of totally enclosed type, as per IP 55 & 65 and suitable for outdoor mounting . bird screen is also provided.

CORROSION FREE : The tower casing is of FRP, fill and eliminator are thus eliminating corrosion, the biggest enemy of cooling tower. All steel components such as support water distribution pipes, hardware etc, are dip or powder coated.

LIGHTWEIGHT: The Towers are compact and light vehicles resulting in easy delivery to site and installation. Lightweight also saves on structural and masonry. Roof installation can also be done without any special reinforcements.



INSTALLATION: Towers of lower capacity are completely factories assembled before dispatch. At site the tower has just to be bolted on the RCC/brick masonry foundation, thus saving a lot of installation times of higher capacity can easily be site and then installed in a manner similar to small towers.

The most economic solution to producing and installing large capacity Towers at some distance from our plant is to assemble the tower on site; this reduces the transport volume to 40% of the total volume.

SERVICE & MAINTENANCE: Maintenance is considerably reduced because fan, sprinkler fill and eliminator can easily be approached from the top without disturbing the cooling tower casing.

PIONEERS: Mechanical strength & durability, high efficiency and installation and maintenance easy.

COMMITMENT TO CUSTOMER SATISFACTION: Classik realized that the true test of Cooling Tower occurs in the field, not in the factory. For this reason, Classik commit customer support both before and after the installation.

The long-standing tradition of technical excellence & customer satisfaction is an obligation accepted by every CLASSIK employee.

The company's commitment to research & development delivers a constant stream of new products as well as refinement in materials & products.

Our-in house engineering capabilities are always available for customer consultation and assistance.

Our field service personals also provide a full range of post sale service ranging from installation assistance to maintenance planning and system upgrade recommendations.

CLASSIK Products come with a one- year warranty on materials and workmanship.

OUR COMMITMENT DEMANDS THE DELIVERY OF THE BEST PRODUCT PERFORMANCE AVAILABLE ANYWHERE –BUT IT REACHES FAR BEYOND THAT.

For a complete package of products & service – for a commitment to customer satisfaction –contact CLASSIK COOLING TOWERS for your requirements, whether they are for Gensets, Induction furnaces, Compressors, Industrial heat process and Plastic Injection m/c.

Now you are having the all facts about CLASSIK FRP COOLING TOWERS, PLEASE CALL CLASSIK TO SERVE YOU BETTER QUALITY WITH MOST EFFICIENT SERVICE.

YOU CANNOT JUST MISS IT!!!

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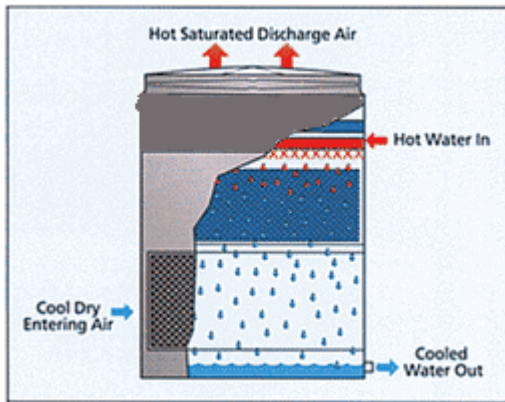
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Introduction

Congratulations on the purchase of your CLASSIK evaporative cooling unit. CLASSIK equipment is constructed of the highest quality materials and designed to provide years of reliable service when properly maintained. Evaporative cooling equipment is often remotely located and periodic maintenance checks are often overlooked. It is important to establish a regular maintenance program and be sure that the program is followed. A clean and properly serviced unit will provide a long service life and operate at peak efficiency.

Principle of Operation



Warm water from the heat source is pumped to the water distribution system at the top of the tower. The water is distributed over the wet deck fill by means of large orifice holes of PVC pipes. Simultaneously, air is drawn in through the air inlet louvers at the base of the tower and travels upward through the wet deck fill opposite the water flow. A small portion of the water is evaporated which removes the heat from the remaining water. The warm moist air is drawn to the top of the cooling tower by the fan and discharged to the atmosphere. The cool water drains to the basin at the bottom of the tower and is returned to the heat source.




CLASSIK ICT Cooling Towers




It is well known in the industry that Induced Draft, Counter-Flow Cooling Towers provide the greatest operating efficiency and easiest maintenance accessibility. Its vertical air discharge and low operating weight provide more design flexibility making it the preferred choice for most cooling tower applications. CLASSIK ICT Cooling Tower features the advantages of the induced draft counter-flow cooling tower design and the high level of quality and service only CLASSIK provides.

The ICT is a heavy duty cooling tower well-suited for industrial as well as commercial applications utilizing its durable construction and ease of maintenance. Its design saves space, blends easily with architectural surroundings and offers low annual operating costs.



Features

-  **Easy Maintenance** Reliable, Accessible Components
-  **Exclusive One Year Warranty** Motor and Fan Assembly
-  **Vertical Air Discharge** Minimizes Possibility of Re-circulation

-  **Efficient Drift Eliminators** Solve Water Carryover Problems
Reduce Water Usage
Lower Operating Costs
-  **Superior Louver Design** Eliminates Splash out, Reduces Algae
-  **Industrial Grade Motors** Totally Enclosed Motors Standard



Re-circulated Water System

Evaporative cooling equipment rejects heat by evaporating a portion of the re-circulated water spray and discharging it from the unit with the hot, saturated air. As the spray water evaporates, it leaves behind the mineral content and impurities

of the supply water. If these residuals are not purged from the water distribution system, they will become concentrated and lead to scaling, corrosion, sludge build-up and biological fouling.

To avoid build-up of residuals in the water distribution system, water must be bled off from the system in an amount equal to the rate of evaporation. In addition, water quality should be checked to ensure that the chemistry is balanced and that the water system is free from biological contamination.

Bleed off

Evaporative condensers and closed circuit coolers are normally supplied with a pump assembly on the side of the unit which incorporates a bleed line and valve. It is recommended that the bleed valve on these units be opened fully to guarantee sufficient bleed volume. If the make-up water is relatively free of impurities, it may be possible to decrease the bleed, but the unit must be checked periodically to make sure that no scale forms and that the water chemistry remains balanced. Open cooling towers and coil products supplied without pumps need to have a bleed line installed on the discharge side of the system pump. A metering connection and globe valve should also be provided. The metering connection is used to determine the bleed water volume. The globe valve is used to regulate flow. The bleed line and valve should be large enough to allow bleed off of an amount of water equal to 3 US gpm for each 100 tons cooling or use the formula $\text{Bleed (gpm)} = \text{Flow (gpm)} \times \text{Range } (^\circ\text{F}) / 1000$.

Water Treatment

In some cases, the make-up water will be so high in mineral content that a normal bleed-off will not prevent scaling. Water treatment will be required and a qualified water treatment company familiar with the local water conditions should be consulted.

Any water treatment system used in the unit must be compatible with the unit's materials of construction. Although high quality galvanized steel is used in most units, alternate materials of construction such as stainless steel and fiberglass are available as options.

If a chemical water treatment system is used, the chemicals selected must be accurately metered and concentrations properly controlled. See Table 1 for recommended levels.

Soft water systems should be avoided.

The use of acid should be avoided. If acid cleaning is required, only inhibited acids recommended for use with galvanized steel should be used.

Caution -Never batch load chemicals into unit. Always regulate chemical feed.

| Parameter | Range |
|---------------------------------|---------------|
| PH | 6.5 to 8.0 |
| Hardness as CaCO ₃ | 50 to 120 ppm |
| Alkalinity as CaCO ₃ | 50 to 100 ppm |
| TDS (Total Dissolved Solids) | <700 ppm |

Table 1 -Recommended Water Chemistry



Control of Biological Contamination

Water quality should be checked regularly for biological contamination. If biological contamination is detected, a more aggressive water treatment and mechanical cleaning program is required. The water treatment program should be performed in conjunction with a qualified water treatment company. It is important that all internal surfaces be kept clean of accumulated dirt and sludge. In addition, the drift eliminators should be kept in good operating condition.

To minimize the risk of biological contamination, at initial start-up or after an extended shut down, it is recommended that the entire system (cooling tower, system piping, heat exchanger, etc.) be properly treated. Clean all debris such as leaves and dirt from the unit.

Completely fill the basin to the overflow level with fresh water. Initiate a biocide water treatment or shock treatment program prior to operating the unit. It is preferable that all such procedures be conducted or supervised by your water treatment specialist.

Air Contamination

If the unit is located in an industrial area where there are chemical fumes, the impurities in the air will be washed out in the re-circulated water and may cause scaling or corrosion. It is important not to locate the unit next to a smokestack because the unit will draw in these fumes and severely corrosive conditions may result. Bleed-off will help the situation, but if there is any sign of corrosion or scaling, a qualified water treatment company should be contacted.



General Information -Start-up & Maintenance

Start-up Details

Shipping Chocks and Debris

Remove any chocks that have been placed inside the unit for shipping purposes. Clean all debris from the pan prior to start-up. Close and secure all access doors.

Bleed-off Line

Make sure a bleed line and valve are installed on the pump discharge side of the system piping to a convenient drain. The bleed-off valve should be open.

Screens

Protective fan screens are provided across the top of the fan cylinders of all models. Check and tighten all bolts.

Adjustment of Float Valve

The float valve should be adjusted to maintain the proper water level as specified in the maintenance instructions. At start-up, the pan should be filled to the overflow level. During operation, the water level will drop to no more than 5" below the over flow. The water level can be checked during operation by opening the removable louver section at the valve while the pump is running and the fans are off.

Starting Sequence

Before starting the unit, check that all access openings, safety screens and covers are in place. Then start the unit as outlined below:

- 1.Fill the pan to the overflow level.
- 2.Start the water pumps. Check the water flow to the unit by checking the spray water pressure at the water inlet. It should be the same as the pressure indicated on the certified drawing.
- 3.Start the fans. Check the fans for proper rotation. Directional arrows are placed on the side of the fan cylinder.

NOTE: Do not operate the fans while the pump is off. Damage to the PVC fill can result during dry operation. Always start the water pumps first, with the fan motors following.

Maintenance

Once the installation is complete and the unit is turned on, it is important that it be properly maintained. Maintenance is not difficult or time-consuming but must be done regularly to assure full performance of the unit. Refer to the maintenance instructions enclosed with the unit for proper maintenance procedures.



PREPARATION BEFORE STARTING

Pump and Piping

- A. Regarding the piping illustration for cooling tower, please refer to the following chart:
- B. When doing the piping work, diameter of the inlet pipe rigged on the hot water basin should be matched accordingly. Flow Control valves should be installed.
- C. The pipe diameter should also match the water flow of tower design.

Preparations Before Operations

- 1 Irrelevant objects by the air inlet or surrounding the fan stack should be removed.
- 2 Be sure that Fan blade will not make contact with Fan stack so as to avoid damage to tower.
- 3 After the above checks have been made, switch the fan motor on and off intermittently to see if the fan revolves correctly. At this time you can also check for any abstract noises or vibrations.
- 4 Clean dust and dirt from inside the cold water basin and then fill basin to the overflow level.
- 5 Remove all foreign objects and materials from the Hot water distribution pans on top of cooling tower.
- 6 Turn Centrifugal Pump on and off intermittently to remove air from pipes and allow water to fill the system.
- 7 When the pump is in normal operation water level will decrease depending on length of run and actually flow rates required. Float Valve should be adjusted at this point to ensure design cold water temp. is being met, flow rate is adequate and all pipe connection are safely submerged.

Power System

- 1 Connect the wires according to wire diagram.
- 2 Re-identify the switches for power system, check if the fuse and connecting wires match with the motor horsepower and avoid single-phase revolution.

Starting

- 1 Start and stop Fan motor, checking to see if motor revolves in the specified direction or if abnormal vibrations or noises begin.
- 2 Check if the Fan Motor is receiving correct voltage and is constant.
- 3 Adjust the water flow with control valves to keep water level of hot water basin between 2~3 inches high.
- 4 Check to be sure desired water level in cold water basin remains constant.

Cooling Tower Operation.

- 1 After five to six days of operation, check fan motor once more to be sure that they have not contact with fan stack.
- 2 The circulation water should be replaced at this time to rid system of dirt and debris and to prevent blockage of piping.



Routine Maintenance

Please consult a water treatment specialist to verify percentage of bleed that should be established on your system. This will be dependent upon the level of calcium, chlorine, and other minerals within your water supply. Be sure to check hot water and cold water basins on a regular basis and clean any debris that is found within these sections of the tower. This will increase the life of your cooling towers because water quality is one of the major reasons behind tower efficiency and structural integrity. Also make a habit of checking Fan Motor, Blades, Dispersion holes and fill material to make sure no blockage is occurring. If so, these units can be cleaned using garden hose nozzles or which simple items like a screwdriver.

SEASONAL SHUTDOWN

- 1 Check fan blades bolts to be tighten.
- 2 All circulating water should be drained and disposed of or placed within a holding tank to prevent damage to piping during winter months in which temperatures will drop below freezing.
- 3 Before restarting cooling tower, be sure that all parts are intact and that nothing is obstructing movable parts which could result in damage. If needed, contact Classik your local service representative to perform an inspection on the cooling tower.

COOLING TOWER PERFORMANCE

Flow rates and water level along with the wet bulb, hot water, and cold water temperatures are the major factors in cooling tower performance. If performance appears to have increased or decreased during life of tower, consult the chart below to find possible reasons. If these reasons are not applicable, contact Classik for a consultation.

| Causes of Increase | Cause of Decrease |
|---|--|
| <ol style="list-style-type: none"> 1. The heat load has increased. 2. Circulating water has decreased. 3. The difference between inlet water temperature and wet-bulb has increased. | <ol style="list-style-type: none"> 1. The heat load has decreased. 2. Circulating Water has Increased. 3. Difference between Inlet and Wet Bulb temperature has decreased. 4. Low inlet water Temperature when entering tower. |

The addition or removal of equipment will affect heat loads. It is important to know what the capacity limitations of your cooling tower is to ensure that you do not adversely affect the performance of the Cooling Tower. It is impossible to get a normal temperature reading at one particular instance because weather conditions throughout the day can affect tower cooling. A series of days in differing conditions should be used to determine an average that will constitute the best determination. In plain, on hot days cooling tower efficiency may decrease, on cold days, cooling tower performance will increase. The addition or removal of equipment also affects flow rates. In addition, flow rates can be affected by pipe blockage or clogging. It is important to keep your pipelines free of debris and to obtain good water treatment that will limit algae, slimes and calcium build-ups. This will also increase the life of your equipment.



TROUBLE – SHOOTING TABLE

| Trouble | Causes | Solutions |
|---------------------------|---|--|
| Noises And Vibrations | <ol style="list-style-type: none"> 1.Loose Bolts 2.Fan Blade tip making contact with fan deck. 3.Fan not Balanced. 4. Bearing Malfunction. 5. Motor Malfunction. | <ol style="list-style-type: none"> 1.Retighten bolts 2.Shut Down, Adjust Motor Base to provide equal clearance Between fan stack and fan. 3.Adjust pitches to equalize 4.Replace bearings. 5.Rewind or replace motor. |
| Power Overloads | <ol style="list-style-type: none"> 1. Excessive drops in Voltage 2. Improper fan blade angle. 3. Motor malfunction | <ol style="list-style-type: none"> 1.Check power supply. 2.Adjust pitches to recommened settings. 3. Replace motor |
| Rise in water Temperature | <ol style="list-style-type: none"> 1.Decrease in water flow. 2.Drop in water level of basin or distribution pans. 3. Decrease in air flow 4. Blockage of inlet louvers | <ol style="list-style-type: none"> 1.Check water pump and pipes for blockage. 2.Clean distribution pans and check float valve. 3.Check fill material for blockage, check reducer v-belts, check motor. 4. Remove debris, be sure louvers are equal distance apart. |
| Drop in Water Flow | <ol style="list-style-type: none"> 1. Blockage of Strainer 2. Water basin level decreases 3. Inadequate water flow from pump. | <ol style="list-style-type: none"> 1.Remove and clean strainer. 2.Adjust float valve. 3.Check pump seals and connections |
| Water carry-over | <ol style="list-style-type: none"> 1. Excessive Water Flow 2. Unevenness of water volume in distribution basin. 3. Excessive air flow. | <ol style="list-style-type: none"> 1.Adjust water flow rate through pumps or with flow valves. 2.Clean distribution pan. 3.Adjust fan blade pitches to reduce drift loss. |

INSPECTION AND MAINTENANCE SCHEDULE

| To be checked | Fan | Motor | Drift Eliminators | PVC Fills | Water Basin | Spray Systems | Structural Systems | FRP Casings | Float Valve | Bleed Rate | Flow Control Valves | Air Inlet Mesh |
|---|-----|-------|-------------------|-----------|-------------|---------------|--------------------|-------------|-------------|------------|---------------------|----------------|
| 1. Inspect for Clogging | | | W | W | | W | | | | | | W |
| 2. Check for unusual noise or vibration | D | D | | | | | Y | | | | D | |
| 3. Inspect bolts & nuts | | S | | | | | | | | | S | |
| 4. Lubricate | | Y | | | | | | | | | | |
| 5. Check water level/quality | | | | | D | | | | | | | |
| 6. Check flow rate | | | | | | | | | | M | | |
| 7. Check for leakage | | | | | S | S | | S | | | | |
| 8. Inspect general | | | Y | Y | Y | | S | Y | Y | | S | |
| 9. Cleaning | R | S | R | R | S | R | | | R | | R | W |
| 10. Repaint | | R | | | | | | | | | | |
| 11. Completely open & close | | | | | | | | | | | S | |

D – daily W – weekly Q – quarterly S – semi-annually Y – yearly R - as required

