Titan

POOL SERVICE INC

Pool Operator's Manual

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Being a Pool Operator

Being a pool operator is a serious responsibility. The patrons who use your facility will expect a clean, safe, well maintained environment for themselves and their families. It is up to you as the pool operator to make sure everything in your facility is exactly as it should be.

In this manual, we will explore all the different systems and knowledge that a pool operator will need to understand to do their job effectively. Pool operators find themselves in many unique situations, and will benefit greatly from having a firm knowledge base to make decisions with.

Failure to follow the rules and guidelines set forth in this manual could have very serious consequences. Warm, high traffic, unfiltered water is a breeding ground for microorganisms. It is up to the pool operator to maintain chemical levels, filtration, and facility cleanliness to prevent injury and disease.

At Titan Pool Service, pool operators will generally be in charge of the lifeguards at their facilities. All managers must be pool operators. While there are many other important duties that a manager/pool operator must undertake, their number one priority will always be patron safety. For a pool operator, this also means maintaining proper filtration and chemicals at all times. Failure to do so could result in serious injury.

Working in the aquatics industry can be fun and interesting. More importantly, however, we must understand that the safety of our patrons is in our hands. We must remain diligent at all times and always maintain our facilities properly.

Conversions and Volume

1 pound (lbs.) = 16 (oz.)

1 gallon (gal.) = 128 fluid ounces (fl. oz.)

8 fluid ounces (fl. oz.) = 1 cup

16 cups = 1 gallon (gal.)

3 feet (ft.) = 1 yard (yd.)

1 meter (m.) = 3.28 feet (ft.)

1 cubic foot (ft^3) water= 7.48 gallons (gal.) water

Surface Area: Surface Area is the area of the uppermost layer of water in the pool. Surface area can be found using **(L)ength x (W)idth**.

Formulas for determining the area of odd shaped pools:

Oval: Area = Radius Vertical x Radius Horizontal x 3.14

Oblong: radius left x radius right x 3.14 + (Length x Width)

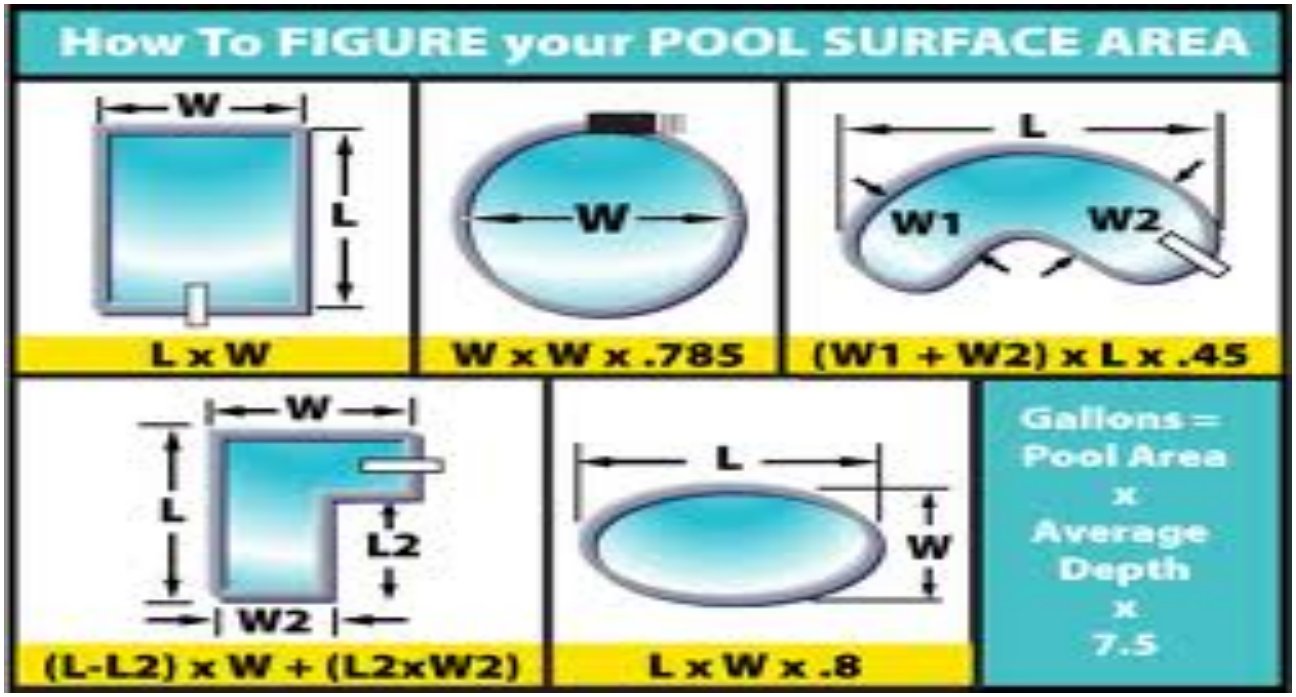
Circular: Radius x Radius x 3.14

Kidney Shape = (diameter of left curve + diameter of right curve) x Length of whole kidney measured from the top x 0.45.

Volume: Volume is the amount of water in the pool. It is very rare that the construction and design of a pool is uniform and exact, so your measurements may be off within 5% and still be considered valid. Volume of a pool can be found using **Length (m) x Width(m) x Average Depth(m) x 7.48** (the amount of gallons in 1 cubic foot of water).

Average depth of a pool with a constant slope: To determine average depth in an area with a constant slope, take the average of the shallowest and deepest depths. For example, a sloped area beginning at 3 meters and ending at 5 meters would have a 4 meter average depth.

Calculating volume in non-uniform pools: To determine the volume of a pool with a non-uniform shape, calculate the depths of each section of the pool and add them together. Most pools have a deep end, or diving well, that is much deeper than the rest of the pool. Use this method to determine volume in these pools.



Regulating Agencies

There are a number of different agencies involved in regulating aquatic facilities. As a pool operator, it is your responsibility to familiarize yourself with the standards and regulations in place. Failure to follow the guidelines set forth by these agencies has serious consequences.

Some agencies are government entities, with laws and codes in place with criminal and civil penalties for negligence:

- Environmental Protection Agency (EPA)
  - Sets standards for storage, cleanup, and disposal of chemicals.
  - Sets standards for use of chlorine gas.
- Occupational Safety and Health Administration (OSHA)
  - Responsible for the MSDS.
  - Sets standards regarding personal protective equipment.
- Consumer Product Safety Commission (CPSC)
  - Keeps records of recalled consumer products (pool toys, flotation devices, etc).
  - Maintains safety standards for safety barriers, entrapment hazards, and swimming pool alarms.
- Department of Justice (DOJ)
  - Sets standards regarding common safety issues.
  - Sets standards regarding disability access.
- Department of Transportation
  - Regulates the transportation of chemicals. Always keep equipment on hand to handle and properly clean up any chemicals you may be transporting.
- Centers for Disease Control (CDC)

    - Attempts to control and prevent spread of disease, injury, and disability
    - Sets standards for preventing contamination through proper disinfection

There are also groups and organizations whose standards and guidelines we follow to maintain health and safety:

- Association of Pool and Spa Professionals (APSP)
    - Has created and applied many different standards and regulations that have been adopted by the federal government
- World Health Organization (WHO)
    - Sets standards aimed at preventing spinal injury and drowning
    - Sets standards regarding chemical exposure and controlling microbiological hazards
- NSF/ANSI Standard 50
    - Standard 50 has been developed by NSF International to regulate and standardize pool equipment that sanitizes, cleanses, and transports water
    - Standard 50 also requires the manufacturer provide a operation manual with all equipment for pool operators to reference
- ASTM International (American Society for Testing and Materials)
    - Develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems, and services.
- National Fire Protection Association (NFPA)
    - Regulates training, signage, and codes related to fire hazards
- American Red Cross
    - Trains and certifies in Lifeguarding and CPR/First Aid

Water Balance

Keeping your water balanced will benefit your pool in many different ways. A well balanced pool is easier to clean, disinfect, and maintain. There are a number of different factors that contribute to balance.

Chlorine: Liquid chlorine, sodium hypochlorite, is the most common disinfectant used in swimming pools. Chlorine should never fall below 1 ppm, and should never exceed 3 ppm. Proper chlorination naturally leads to a cleaner, healthier pool.

pH: pH is a measure of the hydrogen ion concentration of a solution. **Acids** have a low pH, while **bases** have a high pH. The ideal range for pH is between 7.2 and 7.8. The pH can be tested using a simple test kit. Having a high pH can lead to scaling, cloudy water, and clogged filters. **To lower pH, you can use muriatic acid.** Having a low pH can cause corrosion, staining, and etching of surfaces. **To raise pH, you can use soda ash.**

Total Alkalinity (TA): Total Alkalinity is the measure of a pool's resistance to changes in pH. Low TA can cause etching, corrosion, green water, burning eyes, and pH bounce (rapid fluctuation in pH). High TA leads to cloudy water, less efficient chlorine, and pH being harder to adjust. **To raise TA, add sodium bicarbonate. To lower TA, dilute the water or add muriatic acid.**

Calcium Hardness(CH): Calcium Hardness is a measure of calcium content in water. **The normal range of CH is 200 to 400. To lower CH, dilute the water. To raise CH, add calcium chloride.** High Calcium Hardness can lead to corrosion,

scaling, clogged filters, reduced circulation, and irritation. Low Calcium hardness can lead to corrosive water, etching, and staining.

Total Dissolved Solids (TDS): This is the measurement of all the solids currently dissolved into the water. TDS can be measured using a special test. TDS should never exceed 2000 ppm.

Temperature: Temperature should only be a factor in water balance at extreme levels. Be sure to keep spas below 104F (40C), as temperatures above 104F (40C) can cause scaling.

Saturation Index (SI): Saturation Index is the measurement of the solubility of calcium carbonate in the water. SI is a good indicator of water balance, as it incorporates pH, TA, CH, temperature, and TDS. A reading of 0 is perfect, with the ideal range being -.3 to .3. SI above .4 indicates scaling, and below -.3 indicates corrosion. The formula for SI is:

$$SI = pH + Tf + CF + Af - TDSf$$

Tf , Cf, Af, and TDSf are values derived from temperature, calcium hardness, total alkalinity, and total dissolved solids, respectively. SI can be determined using a special tool found in most test kits.

Testing the Water

The water must be tested every hour to ensure a healthy and stable environment for swimmers. In addition to the hourly tests, there are tests that should be done every one to three days to verify that your pool is in top condition. You will use the test kit found in the blue Taylor box.

To test chlorine: Fill the small end of the test tube until you reach the 9 mL fill mark. Add 5 drops of R-0001. Add 5 drops of R-0002. Cap the test and invert it to mix the solution. Judge the final coloring of your test against the colors and record the value. This is your **Free Chlorine.** Now, add 5 drops of R-0003. Cap and invert the test. This coloring is your **Total Chlorine.** Your **Combined Chlorine** is your **Total Chlorine** minus **Free Chlorine.**

To test pH: Fill the large end of the test tube up to the fill line found on the side of the container. Add 5 drops of R-0004. Cap and invert to mix. Judge this color against the test tube and record the value as your **pH.**

To determine the amount of acid to add to a pool to lower pH: Complete all of the steps for a normal pH reading. Add 1 drop of R-0004 into the completed pH test. Cap and invert to mix. Check this result against the test tube and repeat this process until the color of your pH test is at 7.6. Then, locate the chart labeled "acid demand." Using the number of drops it took you to reach an ideal pH and the gallonage of your pool, determine the amount of acid you must add.

To determine the amount of soda ash to add to a pool to raise pH: Complete all of the steps for a normal pH reading. Add 1 drop of R-0006 into the completed pH test. Cap and invert to mix. Check this result against the test tube and repeat this process until the color of your pH test is at 7.6. Then, locate the chart labeled "base demand." Using the number of drops it took you to reach an ideal pH and the gallonage of your pool, determine the amount of soda ash you must add.

Keeping to Code

The Health Department will check on your pool about once a month. The inspector will have a checklist of important items that must be kept in good condition if the pool is to continue running. Some of the most important of these items are:

- The pool is clean of excessive dirt, debris, and algae
- Pool surfaces are not cracking, fragmenting, or broken
- Depth markers are clear and visible
- Ladders and handrails are secured
- Skimmers have weirs, are not clogged, and have suction
- All underwater lights are working and secured properly
- Diving boards are secure
- A shepherd's hook is present, attached to a 16 foot fixed length pole
- A safety line is securely placed between changes in depth in water deeper than 5'
- Pool rules are clearly posted
- Bathrooms are properly stocked and hygienic
- Chemicals are properly stored
- Chlorinators are present and functioning
- A kit capable of testing chlorine, pH, total alkalinity, and calcium hardness
- Gates must self-close and latch
- Phone must be in working order and in view of the pool

Fecal Incidents & Contamination

The most common way for disease to spread in a pool is through fecal matter. It is very important to follow CDC guidelines whenever there is a fecal release in a pool.

Children wearing improper swim diapers are the main cause of fecal incidents. For this reason, be sure to enforce proper swim attire. Some of the most common diseases spread through fecal incidents in swimming pools are:

E. coli: E. coli can cause bloody diarrhea and stomach cramping. Chlorine is very effective against E. coli, and will deactivate it quickly. E. Coli has a CT Value of 1.

Giardiasis: Giardiasis is caused by a microscopic parasite called *Giardia lamblia.* Chlorine is extremely effective against Giardia. Giardia has a CT value of 45.

Cryptosporidiosis: Caused by parasites called Cryptosporidium, Cryptosporidiosis involves cramping, diarrhea, fatigue, and vomiting. Cryptosporidium are extremely resilient, and require extremely high levels of chlorine to kill them in a reasonable amount of time. Crypto has a CT value of 15,300.

Hepatitis A: Hepatitis A can be transferred through stool. The symptoms include vomiting, diarrhea, fever, and liver pain. Hepatitis A has a CT value of 16.

To determine the amount of chlorine to use and how long to close your pool when you know pathogens may be present, you must use something called a **CT Value. CT Value** is the amount of time it takes to inactivate 99.9% of a pathogen at 1ppm chlorine. Scientists have determined this value for us. For instance,

Crypto has a CT value of 15, 300. Therefore, a body of water with 1 ppm chlorine would be 99.9% free of Crypto in 15,300 minutes. You can use this CT value to determine how long you must wait to ensure you have deactivated the pathogen. This can be expressed as:

CT value = C (concentration of free chlorine in ppm) x T (time in minutes)

For example, to determine how long it would take you to deactivate 99.9% of Crypto in a pool with 20 ppm free chlorine:

15,300 (CT value of Crypto*)* = 3 (ppm free chlorine) * T (time)

15,300 / 20 = T

T = 765 Minutes or 12.75 hours

Therefore, you would be able to rid your pool of 99.9% of all Crypto in 765 minutes at 20 ppm free chlorine.

First, remove the fecal release from the pool. Assess if the feces were solid (formed) or liquid (diarrheal). If the feces are solid, raise the chlorine level to at least 2ppm for 30 minutes before reopening. If the fecal release was diarrheal, there is a risk of serious contamination. It is necessary to **superchlorinate** ("shock") the pool. Raise the chlorine levels to 20 ppm and maintain for at least 12.75 hours. Then backwash the pool thoroughly and ensure the water has returned to normal chemical levels before reopening the pool.

Disinfection

There are many steps you must take as a pool operator to prevent the spread of disease at your facility. Your disinfectant can be rendered less effective by many factors, such as the sun, bather load, and chemicals present on bathers. Changes in temperature, pH, and water balance can also affect your disinfectant level. Therefore, it is important to check disinfectant levels often. Low disinfectant levels can lead to bacteria, algae, and sickness.

Chlorine is the most common disinfectant used in pools. It is extremely effective when maintained at proper levels in a properly balanced pool. It is important to test your chlorine level at least once an hour.

Free chlorine: This is the amount of uncombined chlorine available in the water available to disinfect. Free chlorine should be maintained **between 1-3 ppm**.

Combined chlorine: This is the amount of chlorine that has combined with ammonia in the water**,** rendering it less effective and more likely to cause irritation. You can reduce the level of combined chlorine by super chlorinating ("shocking") the pool. Ideally, combined chlorine will be 0. Combined chlorine should never exceed **0.2 ppm.**

Total Chlorine: This is the total amount of free and combined chlorine.

Superchlorination: Superchlorination is the process of raising chlorine levels high enough to disinfect the water or help reset chemical balance. 20 ppm free chlorine is a good minimum level to reach when superchlorinating.

Chlorine comes in many different forms:

Sodium Hypochlorite (Liquid Chlorine): This is the most commonly used disinfectant. Liquid chlorine is typically sent through the return line and into the pool via a machine called a **chlorinator.** The pool operator can use the chlorinator to increase the level of chlorine in their pool.

Calcium Hypochlorite (powdered/tablets): **Powdered** chlorine is most often used to superchlorinate ("shock") a pool. It is less effective for maintaining chlorine levels over a period of time, as its high levels of calcium will affect water balance.. Certain chlorinators use tablets instead of liquid. These tablets may also contain a stabilizer.

Chlorine (gas): Chlorine gas is the strongest form of chlorine. It is also the most hazardous. It reacts with water in a way that produces muriatic acid, lowering pH as it is added. Around one-half pound of muriatic acid is added for every pound of chlorine gas used, which requires a large amount of soda ash to regulate. The hazards and cost of using chlorine lead to it being used least out of the different kinds of chlorine.

Cyanuric Acid: Cyanuric Acid is a stabilizer that can be added to protect chlorine. While not a disinfectant itself, it dramtically increases the effectiveness of chlorine by increasing its resistance to the sun's UV light. Cyanuric acid levels should be between 40-50 ppm and should never be lower than 30 ppm or higher than 60 ppm.

Filter Systems

Typical pool filtration systems consist of many important parts. It is important to understand the function of each section of the system.

Pump: The pump generates the force that moves the water through the system. The pump is generally turned on via a switch on the wall. It is important to secure the hair/lint strainer cover and to verify all the valves are in the correct position before turning on the pump.

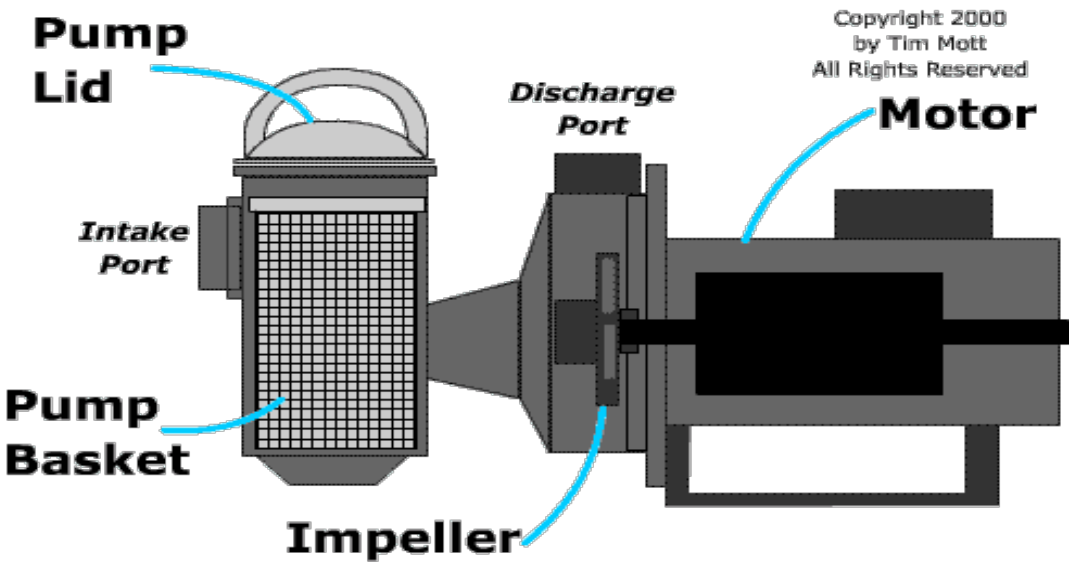
Every pump has the same basic components:

- The volute or pump housing
- The shaft, which is an extension of the pump motor
- Mechanical shaft seals
- A motor adapter and seal plate
- The impeller

The volute is sometimes known as the diffuser. It gives the self-priming pump the ability to handle air and re-prime itself. The shaft is an extension of the pump motor and provides the mechanical motion to the impeller. The impeller causes the water to flow.

Cavitation is when the impeller is deprived of water and cannot operate to its full potential. If cavitation is not handled quickly it could cause major damage to the pump and/or motor. Things that cause cavitation most commonly are:

- Clogged skimmers
- Clogged hair/lint strainer
- Dirty vacuum filter
- A partially closed or restricted suction line
- A throttling valve on the effluent line not properly restricted
- A leak in the plumbing on the vacuum side of the circulation system



Hair/lint strainer: The hair lint strainer is attached to the pump. All of the water that flows through the system will first flow through the basket in the hair/lint strainer. It is important to keep the hair/lint strainer clean in order to maximize flow. The hair/lint strainer should be checked at least twice a day.

Strainer Basket: This basket catches all the large debris that makes it through the **skimmers**. Located inside of the hair/lint strainer, this basket must be checked at least twice a day to ensure proper flow. The basket shown here must be cleaned and replaced to ensure good flow.

Skimmers: Located along the wall of the pool, the skimmers pull water in to the pump. The skimmer itself has a basket to catch debris, and a weir to prevent backflow. It is important to clean the skimmer baskets often in order to maximize the flow from the skimmers through the filter system. One pipe leading out of the ground and into the hair lint strainer will typically be labeled as the **Skimmer Line.**

Main Drain: Typically located in the deepest section of the pool, the main drain is covered by a grate. Pulling water from this part of the pool ensures good circulation. There is typically a pipe coming out of the ground that leads into the hair/lint strainer labeled **Main Drain**. The main drain is the strongest single point of suction in the pool.

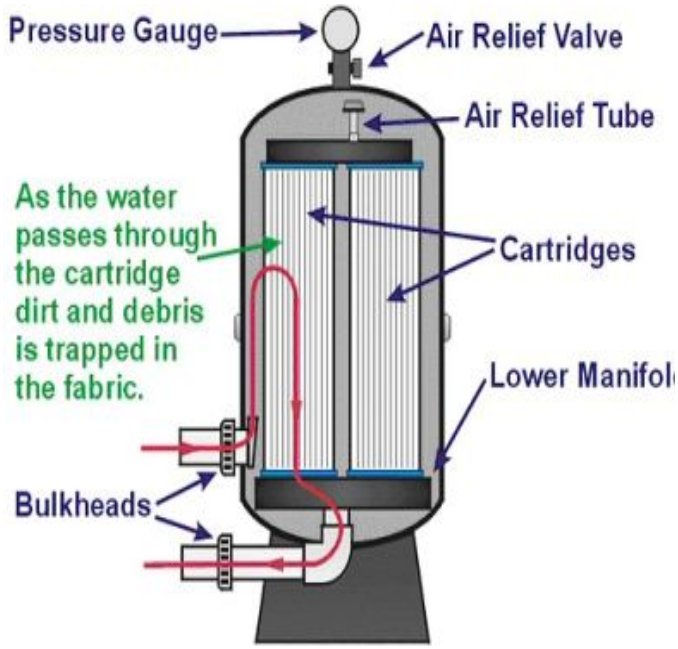
Turnover rate is the time it takes the filter system to move a volume of water equal to the gallonage of the pool through the system. The formula for turnover rate is:

> Turnover Rate = Pool Volume / Flow Rate / 60 (to convert from minutes to hours)

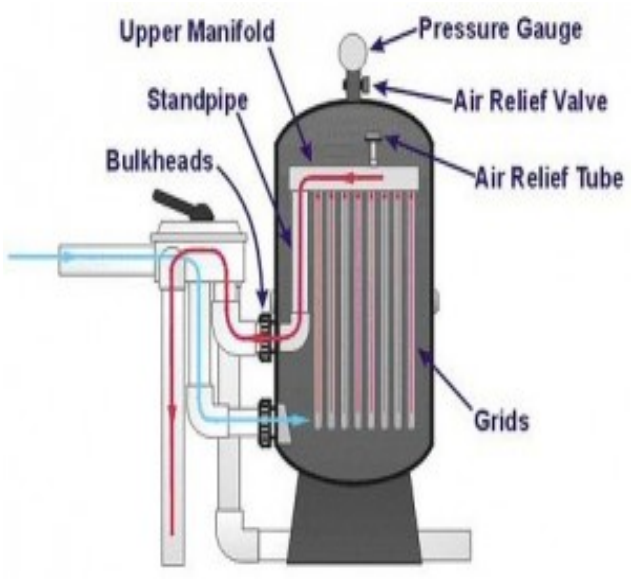
A 6 hour turnover rate is standard in most pools, with a 30 minute rate for spas and 1-2 hour rate for wading pools.

Flow meters: Flow meters measure the amount of water traveling through the system. They are inserted directly into the pipe. Your flow should always meet or exceed the rate listed on the placard in that facility's pump room.

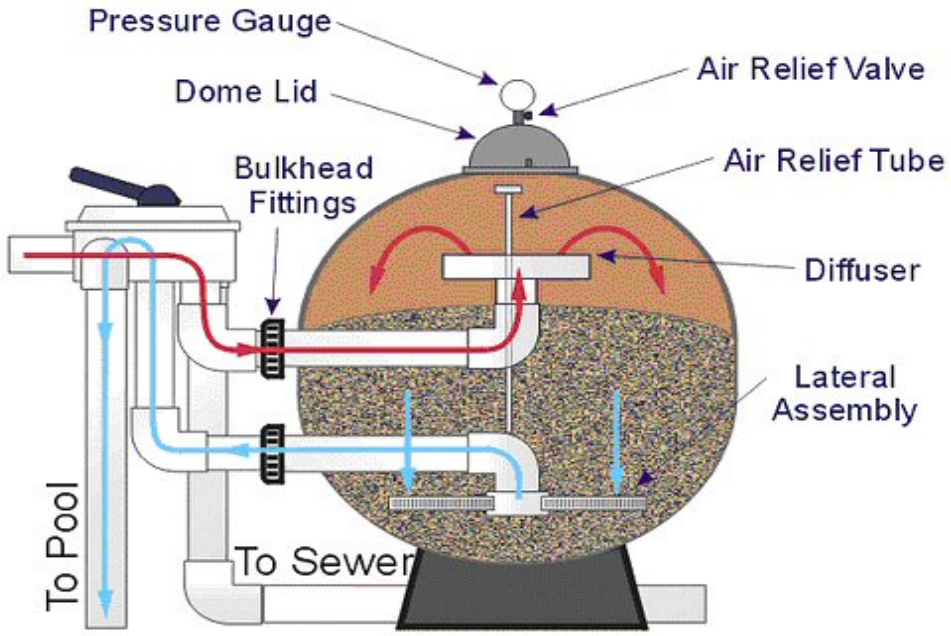
Filters: After passing through the hair through the filters. Filters remove small particles from the water that managed to get by the skimmers and the hair/lint strainer. There are three common types of filters:



Cartridge filters: Similar to sand filters, water filters in through the top and out through the bottom. Inside these filters are cartridges designed to capture grime and debris. Because there is more surface area capturing debris, these filters need less maintenance. If pressure gets too high in a cartridge filter system, you will have to open the filters up and clean the cartridges with degreaser.



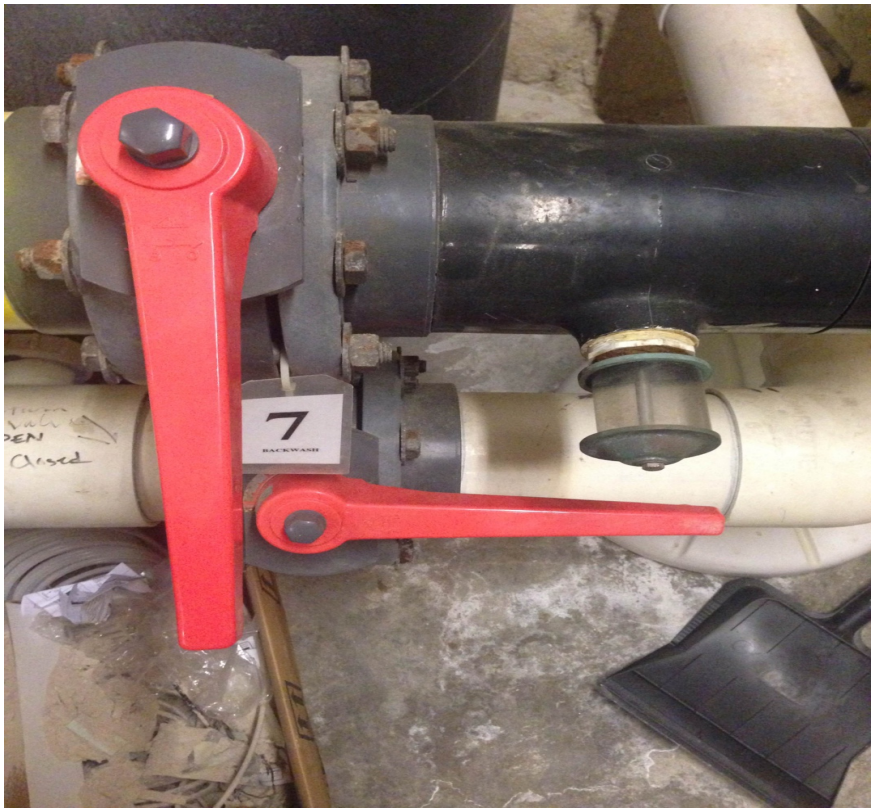
Diatomaceous Earth filters: D.E. filters give great filtration, but require the most maintenance. These filters are similar to cartridge filters, but the cartridges are treated and filled with D.E. After backwashing a D.E. filter, you will have to open the filter up and replace the D.E. that was lost in the backwash process.

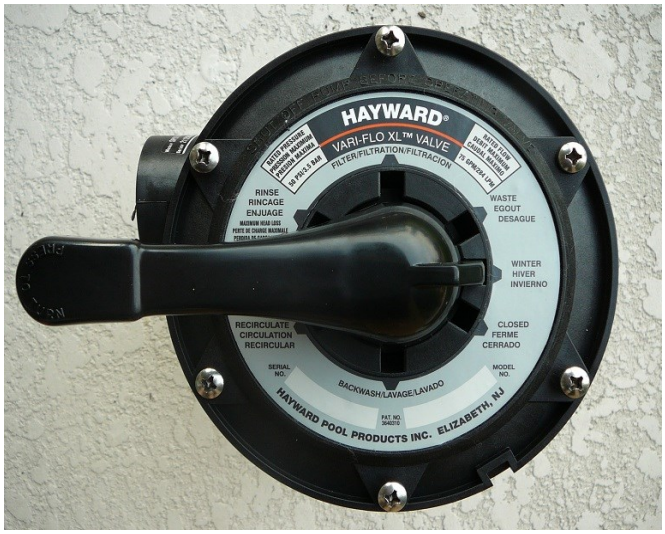


Sand Filters: These filters are filled with sand. Water will flow through the top, and then down through all the sand. Dirty water will remain at the top, and the clean water will pass through the sand and back into the system. Solids and debris will be lodged in this sand eventually, requiring backwashing. Details and instructions for backwashing can be found later in this manual.

Valves: Valves are switches that can be used to allow or bar flow through a pipe. Typically, a valve will be **CLOSED** (not allowing flow) if it is **perpendicular** to the pipe, and **OPEN** (allowing flow) if it is **parallel** to the pipe. In the example, the valve on the white pipe is **OPEN** and the valve on the black pipe is **CLOSED**. Be sure to tightly secure valves when closing them, as even a slight crack will be enough to let a significant amount of water through.

> **Butterfly valves** are the most common valve. Grasp the handle and press in the latch. Turn the valve **parallel** to the direction of flow to open it, and **perpendicular** to the direction of flow to close it.





Multi-port valves can put your pool into many different configurations through rotating only one valve. Each of the possible settings for the valve will be clearly labeled (such as “Backwash”, “Filter”, or “Waste”), allowing the operator to easily switch configurations as needed.

Ball valves are similar to butterfly valves, in that you simply turn the handle parallel to the pipe to open it, and perpendicular to the pipe to close it.

ALWAYS OPEN AND CLOSE VALVES SLOWLY. FAILURE TO DO SO COULD RESULT IN PERSONAL INJURY OR DAMAGE TO EQUIPMENT.

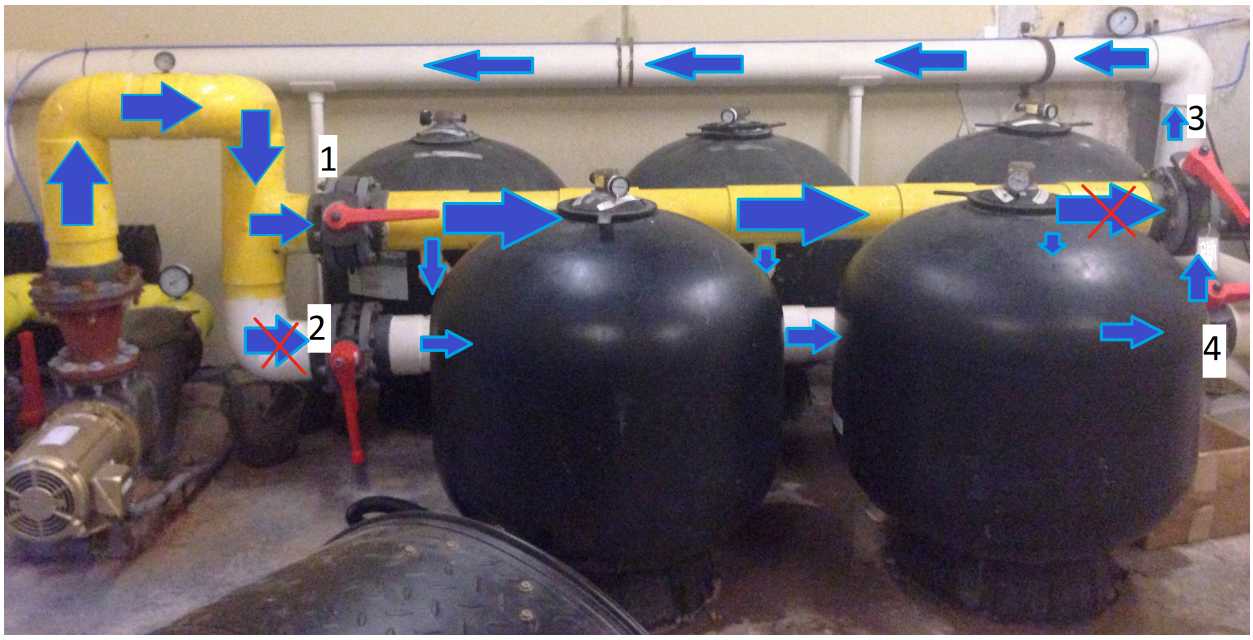
Gauges help you understand what is happening inside your system. They are screwed into the pipes and give you different information depending on their type.

Pressure gauges measure the output performance of the pump. Higher pressure indicates higher "power". Low pressure indicates that the pump will not be able to pull enough water through the system.

Vacuum gauges measure the suction levels in your pipes. When debris builds up in an area, the suction will increase, and increase the reading on the gauge. These gauges measure negative pressure as inches of mercury (in. Hg.)

Filtering

The standard settings that a system runs in are called “filter”. The water will flow up through the main drain and skimmer pipes, through the hair lint strainer and the pump, through the filters, and back into the pool.



In the picture above, the system is set to “**filter”**. The water flows from the pump, up and over to valves 1 and 2. Valve 1 is open, allowing the water to flow through the top to the bottom of the filters. Valve 2 is closed, blocking the water from continuing to the bottom. Valve 3 (the “waste” line, which leads to the sewers) is closed, blocking the water from exiting through the top. The water then flows from the bottom of the filters through valve 4, where it eventually flows back into the pool.

Backwashing

Backwashing is the process of reversing the direction of flow through sand filters in order to free up pressure by removing grime and debris that has built up within. Backwashing will reduce pressure and increase flow. Your facility must always have backwash instructions clearly posted in the pump room.

In the picture above, the system is set to “backwash”. The water flows from the pump, up and over to valves 1 and 2. Valve 1 is closed, blocking the water from flowing into the filters from the top. Valve 2 is open, allowing the water to flow into the bottom of the filers, and out of the top. Valve 4 is closed, stopping water from flowing back into the pool. Valve 3 is open, allowing the water to flow out into the waste line. On the waste pipe there is a small device called a **sight glass.** You should backwash until the sight glass is free of sand and debris. This process usually takes 5 to 10 minutes.

Chemical Use and Safety

Always read and follow the instructions found on chemical storage containers. Proper safety equipment must always be used. This includes **gloves, an apron, and goggles.** It is important to protect yourself and others from chemical irritation. A pool must remain closed for 30 minutes after adding chemicals, unless the packaging states to leave it closed longer. When adding chemicals, it is important to always add the chemicals into water. **Never** add water into chemicals. Be sure not to backwash soon after adding chemicals, as you could lose some of the chemicals you have added to waste.

Material Safety Data Sheets: The MSDS is a set of documents detailing all the chemicals in use at a facility and information regarding their effects. The MSDS is very useful when dealing with spills. Familiarize yourself with the chemicals in use at your facility and how to handle accidents involving them.

Muriatic Acid: When your pH exceeds acceptable levels, you will have to add muriatic acid to the water. There is a test in standard pool test kits that will allow you to determine the proper amount of acid to add. Close the pool to swimmers and distribute the acid in the deepest section of the water. Do not reopen the pool for 30 minutes.

Algaecides: Algaecides are chemicals used to combat the growth of algae. Algaecides can be used regularly to prevent algae or as needed to treat large algae blooms. As with all chemicals, follow the directions on the label.

Flocculants: Flocculants are used to remove suspended particles from the water. Flocculants are useful when you have a high TDS reading. Flocculants work by coagulating with suspended particles, making them bigger and easier to catch in the filter.

Sequestering agents: Sequestering agents are used to remove metal stains from the walls and surfaces. Chemicals in the water can slightly erode the metals, causing them to stain surfaces.

Chemical Storage: It is important to keep your chemicals stored properly to prevent possible accidental mixture. Acids and bases should never be stored together. Chemicals should never be stored or placed outside of their designated areas. Never mix chemicals.

Chemical Feeders

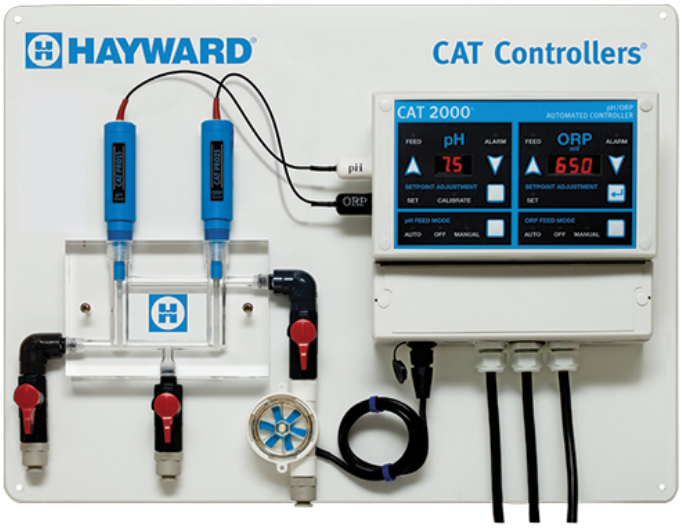
Chemical feeders allow you to add necessary chemicals through the filter system instead of dumping it in the pool by hand. This allows you to safely add chemicals without having to ask patrons to leave the water.

Blue-White Flexflo – The most common chlorinator used at Titan Pool Service facilities. These chlorinators can also be used to feed acid, so be sure to check which chemical feeder you are using!

Erosion feeders – Used most commonly to add bromine to a pool. These chemical feeders are loaded with chemical tablets through the top. They then allow an amount of water to pass through the tank, which adds chemicals to the water. The water is then returned back into the filter system.

Mec-o-Matic Chlorinator

Rolachem Chlorinator



Automated Feeders use advanced instruments and electronics to measure the chemical levels in the pool and will automatically turn the feeders on and off automatically as needed. These systems are very self sufficient and a pool operator generally needs only to monitor these systems to ensure they are working and the feeder has enough chemicals to work with.

Troubleshooting Chlorinators: Chlorinators are machines used to move chlorine from containment vats into the pool. A tube will lead from the containment vat into the chlorinator, then through another tube inside the chlorinator, then out another tube and into the return line. If your chlorinator doesn't work, there are a number of things you can check:

- Ensure the tube leading from the vat is sufficiently primed in the chlorine. Turn off the chlorinator, remove the tube from the chlorine vat completely, and then feed it straight down into the chlorine again. This should fill the tube with chlorine, allowing the chlorinator to pump.
- Check the feed tube inside the chlorinator. Turn off the chlorinator and remove the cover. Remove the feed tube completely and replace it by unscrewing the ends, and screwing in a new feed tube. Note the direction the arrows on the tube are pointing. The tip should point in to the chlorinator on its way in, and it should be pointing out on the way out.
- With the pump turned off, replace the injector located at the point where the tube meets the return line. The injector can be unscrewed and replaced with a new one. Use Teflon tape on the new injector ensure a good seal.

Common Issues

Algae: can form on pool surfaces if the pool is not properly balanced. Having an acceptable chlorine level is usually enough to stop algae. Algae come in many different colors. Green is the most common and easily treatable, followed by yellow. Black algae are the worst kind, sometimes requiring the pool to be drained and acid washed. Algae can generally be treated by brushing.

Cloudy water: Cloudy water is most often caused by poor circulation. Be sure to keep all skimmers, strainers, and filters clean. If any of these pool features become clogged, water is prevented from flowing at maximum rate.

Tile scum: The top layer of water contains all kinds of debris that will form along the tiles. Be sure to keep the tiles cleaned in order to maintain proper chemical balance.

No Flow: If the **flow meter** is not giving you a reading, your pump probably lost prime. Turn off the system, and close the main drain, skimmer, and vacuum lines. Open the hair lint strainer, and fill it up with water. Close the hair lint strainer, and turn on the pump. Watch the gauges and slowly open the main drain and skimmer lines when pressure has built.

High Pressure: If the gauges on the filters read a pressure that is higher than usual for your facility, you will have to backwash. Consult the backwashing instructions in the next section for directions on how to backwash.

Low or stuck flow: Sometimes, the bead that marks the flow is stuck. Using your hand (or something solid), give the flow meter a solid tap. Don't hit it hard

enough to break it. Generally, tapping the flow meter will free the bead inside and allow flow to be read.

Loose main drain cover: If one of the main drain covers comes loose in your pool, you will have to close it to swimmers. The main drains are powerful areas of suction that can cause harm to swimmers. The main drain cover will have to be screwed back in.

Chlorine test comes out clear: If you run your chlorine test and the results end up clear, one of two things may be happening:

- Your water may be "bleached out". This means there is too much disinfectant in the water. Smell the water first. If there is an excessive chlorine smell, there is probably too much in the water. You can also drop two drops of R-002 directly into the body of water you are testing. If the droplets turn bright pink and quickly fade away, the water is probably bleached out. This indicates that there is so much chlorine in the water that the test reagent is being used up very quickly. The easiest way to fix this problem is to backwash and add more water. Adding chemicals to a body of water that has been overloaded with chemicals can lead to more issues.
- There may be no chlorine in the water. Drop two drops of R-002 into the body of water. If the drops do not change colors at all, there is no chlorine in the water. Add chlorine as normal to get between 1 and 3 ppm. You may have an issue with your chlorinator.

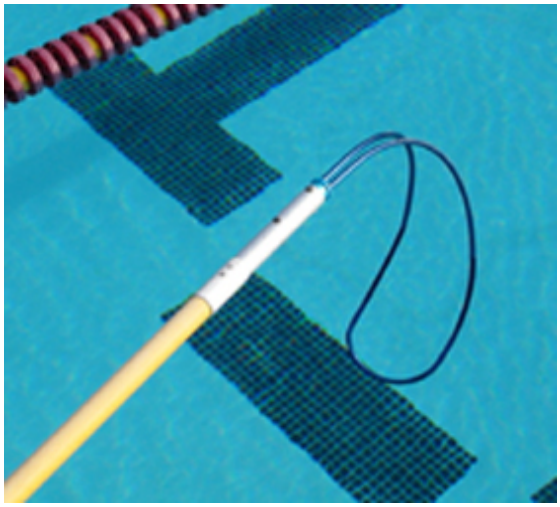
Safety

Your main concern is always safety. There are many tools and pieces of equipment you will use to ensure the safety of everyone at your facility.

Emergency Gates: It is important to keep emergency gates unlocked and unblocked whenever the facility is in use. Emergency gates are used by emergency personnel to quickly and safely transport victims of accidents. It is important to be familiar with your emergency gate and exits, so you can properly assist emergency personnel in case of emergency.

Backboard: You should always have your backboard on the deck and accessible whenever the pool is open. Make sure to always keep the backboard in the same visible area, to ensure it can be accessed quickly in an emergency.

Ring Buoy: Ring buoys are not commonly used, but can commonly be found attached to guard stands. You can throw a ring buoy to a distressed patron and attempt to reel them in.



Shepherd's hook: Shepherd's hooks are becoming outdated, but can generally be found with the other poles. You can use a shepherd's hook to pull a patron in without entering the water yourself.

Rescue tubes: Rescue tubes are the most important piece of safety equipment at your disposal. All lifeguards guarding the pool must have rescue tubes with them at all times. Rescue tubes should not have any deformations or holes. Alert your supervisor if your tubes are not in perfect condition.

Deck markings: There are three common deck markings : **depth markers, no running,** and **no diving.** All 3 of these markings are extremely important to safety. Depth markers allow patrons to know how deep the water is, and to adjust their behavior accordingly. No diving and no running markers are placed along the pool to discourage dangerous behavior. Be sure to notify your supervisor if you see any issues with the deck markings.

Virginia Graeme Baker Pool and Spa Safety Act : In 2007, Congress passed a law governing the safety of drain covers. The new regulations put in place are:

- No pool or spa shall be operated if any covers of vacuum outlets are missing or damaged
- Drains must be at least 3 feet apart and hydraulically balanced
- In the event a pump is replaced, the manufacturer can assist in selecting a pump that will not exceed the cover's maximum rating if 100% of the circulations flow were to pass through the cover

Telephones: It is important to have a working telephone at your facility. If you do not have access to a phone, you do not have access to emergency services. In the event that your telephone stops working, you must notify your supervisor immediately. Your pool will have to close until the phone works.

Inclement weather: If lightning or thunder occurs, you must close your pool for 45 minutes. Direct everyone out of the pool area. Start the 45 minute timer over with each new occurrence. Notify your supervisor.

Main Drain Visibility: If you cannot see the main drain for any reason (including weather, lighting, or water clarity), you must close the pool immediately.