



Aquatic Training & Consulting Services

Pool Operator Supplement

12 Reasons for Pool Closure

- ☠ **No certified operator on duty.**
- ☠ **Lifeguard with current certifications not present.**
- ☠ **Chemicals are out of balance.**
- ☠ **Chemical feeders not operating for more than 24 hours.**
- ☠ **Filtration system not operating for more than 1 hour.**
- ☠ **Water is below the skimmers.**
- ☠ **Main drain is not easily visible.**
- ☠ **Health Inspector denied access to the facility.**
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Basic Pool Operation

- A. Certified Pool Operator must be present for a pool to be open (15 minutes away Mont. Co)
- B. Guard to Swimming Patron Ratio 50 to 1 MD regulation, ATCS recommends 25 to 1.
- C. Factors that affect number of guards on Duty Skill of Swimmers, Number of Swimmers in the Pool, Shape of Facility, Temperature or Activity.
- D. Pool Readings must be taken Chlorine and pH taken every hour, Total Alkalinity, Calcium Hardness and Cyanaric Acid every week.
- E. Phone and Emergencies Phone must be working, occasionally a cell phone will allowed if designated for emergencies only and always plugged in, other wise pool must be closed
- F. Results if no lifeguard on deck pool will be closed by a health inspector
- G. Pool certifications must be posted. Both pool operators and LGT certifications should be posted in the guard room at each pool.



Chemical Safety Guidelines

These guidelines are steps you can follow in order to minimize your risk of being injured by potentially hazardous chemicals at your work place.

- Always wear personal protective equipment including gloves, goggles, an apron, and safety shoes. Unless exposed to blood borne pathogens, used personal protective equipment may be discarded with the trash.**
- All chemicals used for the pool should be stored in a well-ventilated area and inside clearly marked container.**
- Never mix chemicals with any substance other than water. Mixing a full-strength acid with chlorine will release a toxic chlorine gas.**
- When priming a chemical feeder, always point the hose away from your eyes and face.**
- Never store chemicals in anything other than their original container.**
- Take proper precautions and understand the hazards of working with pool chemicals.**
- Wash hands before eating, drinking, smoking and leaving the worksite.**

All pools need chemicals to keep them sanitary and safe according to health department standards. Exercise extreme caution when working with chemicals. Chemicals must be used properly to insure the safety of staff and patrons. Lifeguards must use their senses to detect hazards. Be aware of eye irritation, odors, visible clouds of dust or fumes and leaks or spills.

MSDS (Material Safety Data Sheets) contains a wealth of information including product name, chemical ingredients, health hazards, personal protective equipment, safe exposure limits, spill/fire/emergency information and handling/storage/disposal information.

Only certified pool operators are trained to handle chemicals. Therefore, staff not certified as a pool operator should at no time handle chemicals at the pool.

Use and storage of hazardous chemical products in the work place can expose workers to variety of physical and health hazards. It is your employer's responsibility to educate you on the chemicals used at your facility. It is your responsibility to make sure that your staff has been educated as well.

Chemical	Minimum	Maximum	Raise	Lower
Chlorine	1.5 3.0	10.0 10.0	Chlorine	Sodium Thiosulfate
pH	7.2	7.8	Sodium Carbonate Soda Ash	Muriatic Acid
Total Alkalinity	60	180	Sodium Bicarbonate Baking Soda	Muriatic Acid
Calcium Hardness	150	400	Calcium Chloride	Drain & Fresh Water
Cyanuric Acid	30	100	Cyanuric Acid	Drain & Fresh Water
Total Dissolved Solids	0	1500	Do not want to raise	Drain & Fresh Water

Chemical	Too Low	Too High
Chlorine Sanitizer Disinfectant	No Disinfecting	Bleaching Swimmer Irritation
pH Acidity of the Water	Acidic	Basic
Total Alkalinity pH Buffer	Corrosive Etching	Scaling
Calcium Hardness Mineral for Water	Corrosive Etching	Scaling
Cyanuric Acid Stabilizer	Chlorine Unstable	Difficult to Adjust Chlorine
Total Dissolved Solids Excess Minerals Metals Dirt	Can't Be Too Low	Dirty Water Bad Smell Unsafe

Adjusting Water Chemistry/Saturation Index

pH - The measure of how acidic or basic the water is.

The higher the pH the less effective is the ability of the chlorine to disinfect the pool.

Phenol Red - It is used to measure pH.

7.0 is neutral pH. The pH of the human eye is around 7.5

pH should be maintained between 7.2 and 7.8

Alkalinity - The buffering capacity of the water to maintain its current level of pH. Total alkalinity is the amount of carbonates and bicarbonates in the water.

pH bounce is from too low Total Alkalinity and is where the pH goes up and down uncontrollably.

Calcium Hardness Water needs calcium. If the calcium is not kept up it will take calcium out of the pool shell. If there is too much, it will deposit the excess calcium and clog pipes.

Cyanuric Acid is used to stabilize the chlorine. It is not used in indoor pools. It fights the effect that UV light from the sun has on chlorine. The more cyanuric acid that is in the pool does not make it more effective. The operator should shoot for 40 to 60 ppm for maximum results.

Total Dissolved Solids - Matter that is in the water that is unable to be reduced or eliminated with chemicals.

MSDS - This stands for Material Safety Data Sheets and are required by OSHA (Occupational Safety and Health Administration). These sheets provide complete information on the chemical being used.

Sequestering Agent - A chemical that is added to water which prevents staining by keeping metals and minerals in the water color free.

Too high of Alkalinity, pH or Hardness will cause scaling. (IF SOMETHING IS TOO HIGH THE ANSWER IS SCALING)

Scaling is calcium and other mineral deposits on the walls or in the pipes

Too low pH, Alkalinity or Hardness is corrosive and can cause etching or short plaster life. (IF SOMETHING IS TOO LOW THE ANSWER IS CORROSIVE).

To add chemicals to the pool mix chemical into a bucket of water and then pour into the pool. Each chemical should be done on at a time and should always be added to water.

Filtration

Turnover (the time it takes to circulate all of the water in the pool through the filter)

Turnover Times

Main Pool:	8 hours
Wading Pool:	2 hours
Spa:	30 Minutes
Therapy:	6 hours

Influent Lines - Those lines that bring water into the system (Main Drain, Skimmer and Vacuum).

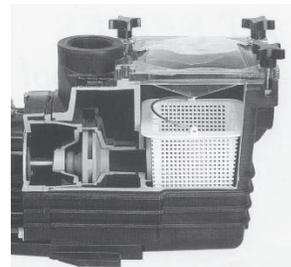
Skimmer are used to collect debris of the top of the water. Weirs keep the debris in the skimmers.

The main drain pulls the water and debris from the bottom of the pool. Less than 50% of the water can be pulled from the main drain into the filter system.

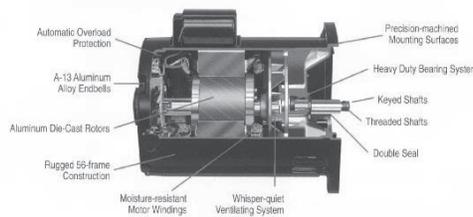
Valves - These control the flow of water in system. Examples are gate, floating, ball and butterfly.



Hair and Lint Strainer (Pot)- This serves as protection for the motor by preventing large debris from damaging the impeller. It is always located before or above the motor.



Impeller - The instrument inside the motor that creates the vacuum pressure that pulls the water through the system.



Priming the pump - This is the process that provides a system enough water to begin filtering prior to the pump being turned on.

Gauges - These are used to measure the pressure in the system. Pressure gauges measure in pounds per square inch (psi). When the influent and effluent gauges are more than 15 psi apart, the operator knows it is time to backwash.



Filter Tanks are used to clean the water. There are three major types of filters.

Flocculent - The most popular flocculent Sodium Aluminate (Alum). It is a filter aid that connects with small particulate matter to make the filter more efficient.

Sand Filter



Cartridge Filter



DE Filter



Filter Run is the time between backwashes

Backwash - The reverse of flow of water through the filter tanks in order to clean out the system.

Filter Run -The amount the “filter runs” between backwashes.

Flow Rate - The amount of water per minute that is returning back to the pool
The flow is measured in gallons per minute (gpm)



Return Water - Water that is going back to the pool through the return line.

Effluent Line - This is the other name for the return line.

Disinfection

Disinfection (the process of killing living microorganism and bacteria to prevent transmission of disease)

Disinfection Levels

Main Pool	1.5	-	10.0 ppm
Wading, Pool, Spa and Therapy	3.0	-	10.0 ppm

Chlorine gas is heavier than air (therefore a ventilation fan should be close to the floor)

Chlorine gas lowers pH.

As precautions gas containers must be chained to wall, gas mask must be present and spray bottle of ammonia must be in pump room to check for leaks.

Liquid Chlorine is also known as sodium hypochlorite.

Sodium Hypochlorite (liquid chlorine) is only 12% ACC

Most pools use sodium hypochlorite and Sodium hypochlorite raise pH

Granular Chlorine or HTH is Calcium Hypochlorite and raises pH

Shock is Lithium Hypochlorite and raises pH/

Free Available Chlorine is the disinfectant that kills bacteria. It is the chlorine that is available for disinfection in the water.

DPD - It is used to measure chlorine.

FAC = DPD 1 & 2

TAC - DPD 1, 2, & 3

CAC = TAC - FAC

Combined chlorine is also known as chloramines

Chloramines - Chlorine that has already connected with ammonia or nitrogen and is no longer useful for disinfection. High levels of chloramines usually cause a strong odor and cloud water.

Chloramines (combined chlorine) provides no disinfection

When combined chlorine reaches .2 ppm the pool should be super chlorinated

Super chlorination takes the reading beyond breakpoint and gets rid of combined chlorine

Breakpoint - The point at which the chlorine is raised to 10 times the combined chlorine level and all of the chloramines are oxidized. (10xCAC)

Superchlorination - The process of surpassing breakpoint by raising the free available chlorine level to more 25 ppm. It is important to do when the water is cloudy.

Bromine is not as effective as Chlorine in normal conditions. However it is not effected by heat and continues to disinfect after combining making it great for spas.

All pools must have an automated system for delivering disinfectant to the water.



Pool Operator Review Sheet



A Certified Pool Operator's main job is to prevent accidents and the transmission of disease in a safe pool environment.



Important Pool Ranges

Chlorine (Main)	1.5 to 5.0
Chlorine (Baby)	3.0 to 5.0
pH	7.2 to 7.8
Total Alkalinity	60 to 180
Calcium Hardness	150 to 400
Cyanuric Acid	30 to 100
Total Dissolved Solids	under 1500

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Thunder Closes Pools for 30 Minutes

Lightning Closes Pools for 1 Hour

No Exceptions!



Check Your Chemicals

*Chlorine and pH should be checked each hour
Alkalinity, Hardness and Cyanuric should be checked each week*

Chemicals - What Do They Do?

- Muriatic Acid** ⇒ **Lowers pH and Alkalinity**
- Sodium Carbonate** ⇒ **Raises pH (known as Soda Ash)**
- Sodium Bicarbonate** ⇒ **Raises Alkalinity (known as Baking Soda)**
- Sodium Thiosulfate** ⇒ **Lowers Chlorine**
- Cyanuric Acid** ⇒ **Stabilizes Chlorine (use outdoors only)**
- Calcium Chloride** ⇒ **Raises Calcium Hardness**
- Sodium Hypochlorite** ⇒ **Raise Chlorine (known as liquid chlorine)**
- Calcium Hypochlorite** ⇒ **Raise Chlorine (known as HTH)**

Langelier Saturation Index

Measures pH, Alkalinity, Hardness and Temperature!
An operator's facility may be within +0.5 or -0.5.

Water that is out of balance...

**Too low is corrosive &
Too high produces scaling.**

**S
A
F
E
T
Y**

NEVER ADD WATER TO CHEMICALS - ALWAYS CHEMICALS TO WATER

NEVER MIX CHEMICALS TOGETHER

STORE CHEMICALS IN A COOL, DRY, WELL-VENTILATED AREA

NEVER STORE LIQUID CHEMICALS ON TOP OF SOLID CHEMICALS

ALWAYS WEAR PROTECTIVE GEAR WHEN HANDLING CHEMICALS

FLUSH EYES FOR 15 MINUTES IF CHEMICALS GET IN EYES



*A Pool Must Have A Working Phone
In Order To Be Open!*