96.08.26

AQUATIC CONTROL SYSTEMS INC.

To assist in controlling bacteria and algae growth. This device will augment bactericidal and algicidal activity of primary disinfectants such as chlorine and bromine, etc. in swimming pools and spas.

A minimum of 0.6 ppm of available chlorine or the equivalent bromine must be maintained. In case of regulated pools, Provincial or Municipal regulations must be followed.

DOMESTIC

REG. NO. 24553 P.C.P. ACT

Warning. Copper levels over 0.6 ppm and a pH reading over 7.6 may cause copper to precipitate onto the pool walls and floor. Bring the pH down to 7.2 and the copper will be back into range before long.

READ THE LABEL AND GUIDE BEFORE USING

AQUATIC CONTROL SYSTEMS INC.
317 Medway Road,
Arva, Ontario Canada N0M 1C0

Aquatic Control
SYSTEMS INC.

SPACE AGE IONIZATION OF SWIMMING POOLS

Reg. No. 24553 PCP Act

Domestic

Read Label Before Use

317 MEDWAY ROAD
ARVA, ONTARIO NOM 1C0
(519) 660-0820

OWNER’S MANUAL

FOREWORD

The Aquatic Control System was founded in 1992.

The main goal was to find an alternative to the heavily chlorinated swimming pools so people could enjoy swimming in almost chemical free water. This is of special concern to people with sensitive skin who experience reactions from exposure to Chlorine or Bromine.

A lot of R & D has gone into this project and several proto-types have been exposed to almost four years of field trials under a host of various conditions.

The Aquatic Control System has been installed in the company pool for the last four years, and the analysis have been maintained within completely acceptable standards.

Lithium Hypochlorite has been used as a disinfectant with great success in the company pool.

Algaecides have never been needed nor applied to the pool, and the Provincial Government has frequently tested for E. coli and S. faecalis, and the results have always been satisfactory.

Christian J. Have
Pres.

Essentials for the greatest efficiency of your ionization System:

FILTRATION:

Proper filtration makes your pool water sparkling clean and enjoyable. Make sure your filter system is operating properly and runs long enough each day (2 turns per day). With proper filtration your ionization System will be able to do its job without mechanical interference.

TEST TO KEEP TROUBLE AWAY:

Test pH and Copper at least once a week. That way you will be able to spot any changes in your pool water and do something about them fast before a problem arises.

If there has been significant fluctuation in the copper or pH levels, you should do a full routine water test.

It's easy to do a routine water test. We recommend a Taylor Kit #2005 or have your pool maintenance company do this for you.

What information Does the Taylor Kit Give You?

It checks the pH level (part hydrogen or acidity level), acid or base demand of the water, total alkalinity (keeps the pH in balance), calcium hardness, and free and total chlorine. But remember, reagents must be replaced each year to be sure tests are correct.

THE BEST WATER CHEMISTRY BALANCE

	Recommended levels
pH	7.2 to 7.4
Total Alkalinity	80 to 120 ppm
Calcium Hardness	200 to 275 ppm for gunite Less than 350 for spas and vinyl pools
Copper	0.3 to 0.5 ppm
Free Available Chlorine	0.6 ppm minimum

Ionization is very effective in preventing the growth of algae. When the water is balanced it will also reduce maintenance time and the use of other chemicals such as stabilizers, algaecides, chlorine and bromine. HOWEVER, the pool owner must still perform some chemical balancing procedures in order to maintain a healthy crystal clear swimming pool or spa. The key to water treatment is an understanding of how chemicals interact in the pool water - a constant play between demand and balance.

Demand - This terms represents the need to add chemicals and disinfectants to the water.

Balance - Balance means all chemicals that have ben added to the water are working efficiently within recommended ranges. When the ion, pH, total alkalinity, calcium hardness, and total dissolved solid concentrations are at the desired levels, the chemicals are working most efficiently and the pool is most easily and economically maintained.

Ion Residual - Ions remain in solution until combining with other elements or being absorbed by algae. The ideal ion level that should be maintained in the pool is .3 parts per million (ppm). Although algae will be killed at a lower level, .3 ppm will

provide very good protection while remaining within Health and Welfare Canada Guidelines for copper in drinking water.

pH CONTROL

As pH climbs, free copper ions in the water will be reduced as they combine with other minerals to form precipitates. Additionally, water with high pH can cause scale building up on plaster walls and prohibit most chemicals from working. The ionization process will work in acidic water; however, if the pH falls below 7.0, the water will become corrosive. Acidic water can damage pool equipment, pipes, fixtures, stain pool plaster, irritate swimmer eyes and noses, and decrease the useful life of electrodes.

The following scale provides an understanding of the ways to balance pH:

6.8 - 7.2	7.2 - 7.4	7.4 - 8.0
Add Soda Ash	IDEAL	add Dry Acid

Soda and acids may be purchased at any pool store. During the summer months, pH should be monitored at least once a week. The pH should always be tested after rain storms or heavy bather loads. If the pool is covered, it is important to check pH as a covered pool is more susceptible to scaling. Maintaining a total alkalinity of 80 to 1200 parts per million will help to stabilize the pH.

A new plaster pool will leach high pH into the water during the first few months of use and will usually require frequent pH adjustments before the plaster cures and finally settles down.

Liquid muriatic acid, if applied incorrectly, can reduce the total alkalinity of your water. We suggest the use of dry or granule acid to reduce pH without changing the total alkalinity.

Total Alkalinity - Total alkalinity refers to the amount of hydroxides, bicarbonates, and carbonates (baking soda) present in the pool water. As mentioned above, keeping the total alkalinity at a level of 80 to 120 ppm will help keep a stable pH level of 7.2 to 7.4.

Calcium Hardness - Calcium water hardness refers to the amount of calcium carbonate and magnesium in solution. A high hardness level in combination with a high alkalinity can cause scaling on plaster and pool equipment. Hardness also effects the rate at which the system will ionize water. Hard water, at levels above 350 ppm will cause greater electrical conductivity and thus a faster rate of ionization. If calcium hardness exceeds 350 ppm,

the pool should be drained by about one-third and fresh low calcium or soft water should be added. In vinyl liner pools and acrylic spas, the calcium is not as critical as in concrete pools.

Opposite to "hard" water is "soft" water, or water in which there is a low level of calcium and magnesium. While the virtues of soft water are often desired in reference to washing one's hair or clothes, soft water is not desirable in swimming pools and spas. In plaster pools, lack of calcium in the water may cause weakening and/or etching of the walls. In pools and spas, the same conditions will cause a deterioration of the grouting between the tiles. In addition, soft water can be corrosive to pool fixtures.

Oxidation - The ionization process is extremely effective at preventing the growth of algae through the destruction of the organism's enzyme balance. However, the process is unable to address the removal of organic material, body oils, suntan lotions. The presence of these materials can cause cloudiness in the water or an oily residue along the walls at the water line level. A treatment of potassium monopersulfate (oxy-brite), bromine, or a chlorine shock will remove the organic material from the water.

Copper Testing and Ion Level Control - Ions will not evaporate into the air, but rather remain in suspension in the water until consumed by the micro-organisms they attack. After the initial start up and adjustment period, ion level testing need only be done about once a week.

Ion level in the water can be adjusted by either changing the ION OUTPUT or the length of time the ionization System runs, or both. The ideal lon Level to maintain in your pool or spa is 0.3 ppm. Although the algae will be killed at a much lower level, 0.3 ppm will provide effective protection even during peak hot periods during the summer.

To determine the lon level, use the test kit provided with your ionization System.

Water Chemistry and Pool Liners:

Stains of various colours and sizes are almost inevitable on pool walls. With the Ionization technology and the proper water chemistry balance as mentioned earlier, staining from copper ions should not occur.

One source of stains is calcium deposits which form when the chemical balance is not monitored carefully. Calcium in a pure

state is white but will easily be stained by copper, dirt, and other water borne impurities.

Another source of staining (and one of the most difficult to remove) is from certain types of algae. Most algae are of a green or yellow variety and are easily eliminated by the ionization process. Blue green algae and some mustard algae are the most difficult to eliminate even with the ionization process. Blue green algae appears as small black spots and will grow roots into plaster walls. The algae will form protective sheath which makes it resistant to normal ion or chemical treatment. In advanced outbreaks of blue green algae brushing of the spots followed by a chlorine shock and algicide may be needed to eliminate the algae. The final step that can be taken in extremely severe cases of algae and stains in a gunite pool may be an acid bath of the pool walls.

Vinyl pool liners, especially older liners, are very susceptible to stains. The vinyl material used in the liners is very porous in nature. Chlorine will act to leach out the polymers used to create the material. The result of this process is an initial fading of the vinyl and eventual disintegration of the liner. During this process, the material becomes very susceptible to permeation by both minerals and algae stains.

Acrylic spas are not prone to stains, although misuse of chemicals can destroy the finish.

Develop Good Maintenance Habits

Pool and spa maintenance can be reduced by adopting some routine maintenance habits. Regular vacuuming, backwashing of sand filters and cleaning of the cartridge filters is a good habit. The skimmer and strainer basket should be checked for debris, and the water chemistry such as pH and ions tested weekly. A good test kit will be a great help. Keep the scum line clean and inspect the deck equipment to ensure it is in good repair.

TROUBLESHOOTING GUIDE

WHEN A PROBLEM ARISES, GO BACK TO BASICS, FOLLOW THE STEPS FROM ONE TO SIX PRIOR TO CALLING FOR HELP. MANY TIMES A SIMPLE ADJUSTMENT OF THE WATER PARAMETERS WILL FIX WHAT SEEMS TO BE A MAJOR PROBLEM.

1) TOTAL ALKALINITY MUST BE BETWEEN 80 AND 120 PPM

   Adjust the total alkalinity to 100 ppm using the charts in the back of this manual.

INCREASE total alkalinity by adding buffer or booster while the pump is running.

DECREASE the total alkalinity by adding liquid muriatic acid. Turn the pump OFF and add small amounts to numerous spots in the water.

NOTE: If you adjust the total alkalinity, wait 24 hours before testing the pH.

2) THE pH SHOULD BE BETWEEN 7.2 AND 7.4

Adjust the pH to 7.2 - 7.4 using the charts in the back of this manual.

INCREASE the pH by adding Easy-Up or soda-ash while the pump is running.

DECREASE the pH by adding Easy-Down or dry acid while the pump is running.

3) THE CALCIUM HARDNESS SHOULD BE WITHIN THE FOLLOWING RANGE

CONCRETE OF GUNITE POOLS	200-275 ppm
VINYL LINER POOLS	less that 350 ppm
SPAS	less than 350 ppm

Adjust the calcium hardness using the chart in the back of this manual.

INCREASE the calcium by using Mor-Cal, Calcium Chlorite, or a calcium booster.

DECREASE the calcium by diluting the water. Consult a specialist before attempting this. In spas, dump the water.

4) THE TOTAL DISSOLVED SOLIDS SHOULD BE LESS THAN 1800 PPM

DECREASE the total dissolved solids by diluting the water. Consult a specialist before attempting this. In spas, dump the water.

5) A stabilizer is NOT required for the ionization process to be effective.

6) THE COPPER LEVEL SHOULD BE KEPT BETWEEN 0.3 PPM AND 0.5 PPM

INCREASE the copper content of the pool water by turning up the control knob on the main unit.

DECREASE the copper by turning the control knob down. The control unit can be turned off if the copper level is over 0.7 ppm.

Free chlorine levels in excess of 1 ppm will interfere with the copper test kit. A chlorine neutralizer will be required, or a low chlorine residual to ensure the accuracy of the copper test.

As the pH rises, some of the free copper ions will combine and show a low copper reading. Verify the pH is below 7.4 for the most accurate copper test.

7) IF THE WATER IS CLOUDY

IT SHOULD BE EITHER A GREEN OR WHITE COLOUR

1 GREEN LOOKING WATER can be caused by:

a) Algae
b) Poor Filtration
c) Not running the pump long enough

REMEDY

I) Make sure the copper level is 0.3 ppm or higher
ii) Make sure the pH is less than 7.6
iii) Backwash the sand filter or clean the cartridge filter
iv) Shock the pool with an unstabilized chlorine (A.C.S. recommends liquid chlorine, Lite-Shock or a lithium-based chlorine)
v) Run the pump filter for at least 72 continuous hours

11 WHITE CLOUDY WATER can be caused by:

a) Organic loading from body oils, perspiration or suntan lotion
b) Poor circulation or filtration
c) High pH
d) High total alkalinity
e) High total dissolved solids
f) Did you recently install the Ionization System?

REMEDY: (by corresponding letter)

a) Add an oxidizing agent such as liquid chlorine, lithium chlorine (Lite-Shock), Oxy-Brite, Oxy-Out or Shockline

b) Run the pump and filter continuously, backwash sand filters and clean cartridge filters
c) Test the pH and add dry acid (pH down) if it is over 7.7
d) Test the total alkalinity and add liquid muriatic acid if it is over 120 ppm. (turn the pump off and add small amounts to numerous places in the water.)
e) High total dissolved solids over 1800 ppm can only be reduced by diluting water. Sometimes a water clarifier or flocculent will help.
f) Sometimes the ionization process will react with existing chemistry in water. Cloudy water occurs with older equipment and previous bromine use. This is a short term problem which will rectify itself in 3-7 days.

Run the pump and filter continuously. Backwash sand filters and clean cartridge filters frequently.

8) IS THERE ALGAE PRESENT?

(In spas or vinyl pools the walls will be slippery, in concrete or gunite pools, there will be green marks at various places around the pool.)

ALGAE can be caused by:

a) High pH
b) Low copper
c) Too much sequestering agent
d) Copper resistant strain of algae

REMEDY (by corresponding letter)

a) Test the pH and decrease it with dry acid if it is over 7.6 (verify the total alkalinity is less than 120 ppm)

b) Test the copper level and turn the ion output knob on the control unit up if the copper level is less than 0.3 ppm. In some cases a copper level of 0.5 or 0.6 ppm will be required if the environment has lots of trees or shrubbery.

c) Products like Cop-Out, Min-Arrest and Sequasol are designed to attack the copper ion in water. If these products are used the Ionization System will not function properly. Sequestering agents just

mentioned will slowly dissipate from the water over a 2 to 3 week time period. The use of chlorine or a non-copper-based algaecide will be needed to contain the algae growth until the sequestering agent has left the water.

d) Some algae has built up an immunity to copper ions. If this strain of algae grows, then an unstabilized chlorine shock treatment will be required. (A.C.S. recommends Lit-shock, liquid chlorine, or a lithium based chlorine.)

e) IN ALL CASES OF ALGAE GROWTH, a shock treatment of unstabilized chlorine will normally kill the growth.

9) IF THE WATER IS CLEAR WITH NO SIGN OF ALGAE, YET THE VINYL WALL IS SLIPPERY:

In new vinyl liner pool installations, the vinyl will leach a plasticizer which is used in the manufacture of vinyl. This plasticizer is an ideal food source for some bacteria resulting in the liner being covered with bacterial growth.

REMEDY:

I) Shock the pool with an unstablilized liquid chlorine (A.C.S. recommends Lite-Shock, a lithium-based chlorine, or liquid chlorine.)

ii) Brush the walls frequently.

10) DISCOLOURED WATER

A) REDDISH-BROWN water is usually high iron, while
B) GREEN water normally can be traced back to algae or caused by high combined copper.

REMEDY: (by corresponding letter)

a) For iron, the use of Metal Magnet, M.S.R., Min-Arrest or Sequasol will remove the iron. One problem with using these products is that they disrupt the ability of ions to kill algae. Therefore, algae may develop and a chlorine shock treatment will be required.

b) For algae, see the "Algae section"

For high combined copper, turn off the ionization System and wait for the copper to dissipate through normal use. If the high copper has started to stain the equipment, follow the remedy described in 10A above.

11) STAINS

THREE COLOURS OF STAINS ARE PREDOMINANT

1 BROWN
11 GREEN
111 BLACK

1 BROWN stains can be:

a) Iron or rust marks
b) Mustard algae. If the spot brushes off very easily but comes back in the same spot, it is probably mustard algae.

REMEDY: (by corresponding letter)

a) For iron spots, turn the pump off and sprinkle ½ a cup of Easy-Down or some granular pH reducer directly onto the spot. Wait 5 minutes then brush the spot, If the brown stain is all over the pool or spa, lower the pH to 7.0 or less and wait a couple of days. Sometimes a low pH will re-dissolve metal precipitation back into the water.

b) If mustard algae is growing, it is probably due to a pH over 7.6, a total alkalinity over 120 ppm, or a copper level less than 0.3 ppm. Correct the parameter which is out of tolerance and wait a couple of days for the algae to be killed.

11 GREEN stains can be:

a) Copper precipitation if it covers all of the pool or spa, usually caused by a high pH or a high copper concentration.

b) Green algae if the stain is only in a few locations.

REMEDY: (by corresponding letter)

a) To remove copper precipitation, lower the pH to 7.0 or less for a couple of days. Sometimes a low

pH will re-dissolve the copper back into the water. For quick results, turn the pump off and add Easy-Down or some granular pH reducing product directly onto the stained areas. Sprinkle handfuls across the surface of the water and wait 10 minutes. The stains will come out on contact. Concrete or gunite pools may require a special procedure called a no-drain acid wash.

b) Green algae is the most common algae. Make sure the pH is less than 7.6, the total alkalinity is less that 120 ppm, and the copper level is more than 0.03 ppm. Refer to the "algae section" for a remedy.

111 BLACK stains can be

a) Copper stains due to a pH over 7.6 or a total alkalinity less than 60 ppm
b) Dirt
c) Blue green algae
d) Black spots after shocking the water

REMEDY: (by corresponding letter)

a) Turn the pump off and sprinkle Easy-Down or a granular pH reducer directly onto the black spots. Wait 10 minutes and brush the spot. If the stain persists, with the pump still off, put a cup of granular pH down into the water directly above the stain. the, immediately put 1/4 cup of lite-sock or a lithium-based granular chlorine into the water above the spot. Wait 10 minutes and brush the spot. Concrete or gunite pools may require a special procedure. Unfortunately, this will require a service call from an authorized A.C.S. service representative.

b) Vacuum the dirt.

c) Blue-green algae is the toughest algae to eliminate. Blue green algae has a hard outer shell which must be vigorously brushed off. Follow brushing with Algimycin 400 algaecide or an unstabilized chlorine shock treatment A.C.S. recommends lite-shock, a lithium-based chlorine, or liquid chlorine.

d) Did you recently shock the water with chlorine? Chlorine can knock copper ions out of solution.

Especially if the pH is over 7.6, the total alkalinity is below 60 ppm, or the copper level is over 0.7 ppm, chlorine oxidizes the ions, turns them black, and drops them to the bottom of the pool or spa.

Turn the pump off and sprinkle Easy-Down, or a granular pH reducer directly onto the back spots. Wait 10 minutes and brush the spot. Concrete or gunite pools may require a special procedure. This will require a service call from an authorized A.C.S. service representative.

Adjust the total alkalinity to 100, wait one day, and adjust the pH to between 7.2 and 7.4.

12) IF THE BATHERS GET BURNING EYES

It is probably caused by:

a) High pH
b) High organic loading

REMEDY:

i) Lower the pH to between 7.2 and 7.4

ii) Oxidation is required. Use oxy-brite, oxy-out, shocktrine or an unstabilized chlorine shock treatment like lithium.

13) IF THE BATHERS GET A GREEN TINGE TO THEIR HAIR

Some blondes or salon-treated hair can be susceptible to discolouration. This is usually caused by:

a) High copper
b) Water chemistry unbalanced
c) Chlorine reaction

REMEDY:

i) For best results in taking the discolouration out of the hair, treat it while it is still wet. Use vinegar or a special shampoo normally available at your hairdresser’s.

ii) Decrease the copper level.

iii) Verify the pH is between 7.2 and 7.4 and the total

alkalinity is between 80 and 120 ppm.

iv) Change the brand of chlorine being used.

EFFECTS OF PH ON COPPER IONS

pH, or parts hydrogen, is the measurement of the acidity level of your water. pH of 7.2 to 7.4 is ideal for Ionization Capability and is also very good for bather comfort. Your eye has a pH of 7.5 which is the range your body likes.

((INSERT GRAPH ILLUSTRATION))

At high pH levels, the copper ion converts to its metallic form and will eventually deposit as a stain on your pool wall or floor.

CALCIUM HARDNESS
The Forgotten Parameter

200 -275 PPM FOR CONCRETE OR GUNITE POOLS

LESS THAN 350 PPM FOR VINYL OR SPAS

The term "hardness" comes from past folk terms. Water that contained high levels of calcium and/or magnesium consumed soap, forming a grey insoluble curd, before suds were formed. That is, this water was "hard to form suds". Rainwater gathered for laundry use, formed suds readily and was called "soft water".

PROBLEMS

LOW CALCIUM HARDNESS CAN CAUSE

- Aggressive Water
  - pitting of concrete
  - metals stripped
  - staining
  - low copper reading

HIGH CALCIUM HARDNESS CAN CAUSE

- Scaling
  - short filter runs
  - reduced circulation
  - cloudy pool
  - over Ionization

TOTAL ALKALINITY

The Key to Water Balance

BETWEEN 80 & 120 PPM

Total Alkalinity is the measure of the ability of a body of water

to resist changes in pH. That is the ability to "buffer" water from wild swings in pH. It is essentially a measure of dissolved bicarbonate in pool water. T.A. is the governor of pH.

PROBLEMS

LOW TOTAL ALKALINITY CAN CAUSE

- Corrosion
  - pitting of concrete
  - metals stripped
  - staining
  - pH hard to control

HIGH TOTAL ALKALINITY CAN CAUSE:

- Scaling
  - short filter runs
  - reduced circulation
  - cloudy pool
  - pH Drift to 8.4
  - Ion inefficiency

CORRECTION OF PARAMETERS

	TOTAL ALKALINITY	CALCIUM HARDNESS	pH
to INCREASE	Sodium Bicarbonate	Calcium Chloride	Sodium Carbonate
to DECREASE	Muriatic Acid	Dilution	Sodium Bisulphate (Dry Acid)

DECREASING pH

ADDING SODIUM BISULFATE

(Dry Acid)

METRIC TABLE
Litres of Pool Water

pH of	2,0001	20,0001	40,0001	80,0001	200,0001	400,0001
7.4	15.00 g	150.00 g	300.00 g	600.00 g	1.50 kg	3.00 kg
7.6	30.00 g	300.00 g	600.00 g	1.20 kg	3.00 kg	6.00 kg
7.8	45.00 g	450.00 g	900.00 g	1.80 kg	4.50 kg	9.00 kg
8.0	60.00 g	600.00 g	1.20 kg	2.40 kg	6.00 kg	12.00 kg
8.2	75.00 g	750.00 g	1.50 ka	3.00 kg	7.50 kg	15.00 kg
8.4	90.00 g	900.00 g	1.80 kg	3.90 kg	9.00 kg	18.00 kg
8.6	105.0 g	1.05 kg	2.10 kg	4.20 kg	10.50kg	21.00 kg

INCREASING pH
ADDING SODIUM CARBONATE

METRIC TABLE
Litres of Pool Water

pH of	2,0001	20,0001	40,0001	80,0001	200,0001	400,0001
7.0	7.50 g	75.00 g	150.00 g	300.00 g	750.00 g	1.50 kg
6.8	15.00 g	150.00 g	300.00 g	600.00 g	1.50 kg	3.00 kg
6.6	22.50 g	225.00 g	450.00 g	900.00 g	2.25 kg	4.50 kg
6.4	30.00 g	300.00 g	600.00 g	1.20 kg	3.00 kg	6.00 kg
6.2	37.50 g	375.00 R	750.00 g	1.50 kg	3.75 kg	7.50 kg
6.0	45.00 g	450.00 g	900.00 g	1.80 kg	4.50 kg	9.00 kg

INCREASING CALCIUM HARDNESS
ADDING CALCIUM CHLORIDE DIHYDRATE

METRIC TABLE
Litres of Pool Water

Desired Increase in ppm	2,000 1	20,000 1	40,000 1	80,000 1	200,000 1
10 ppm	30.00 g	300.00 g	600.00 g	1.20 kg	3.00 kg
20 ppm	60.00 g	600.00 g	1.20 kg	2.40 kg	6.00 kg
30 ppm	90.00 g	900.00 g	1.80 kg	3.60 kg	9.00 kg
40 ppm	120.00 g	1.20 kg	2.40 kg	4.80 kg	12.00 kg
50 ppm	150 00 g	1.50 kg	3.00 kg	6.00 kg	15.00 kg
60 ppm	180.00 g	1.80 kg	3.60 kg	7.20 kg	18.00 kg
70 ppm	210.00 g	2.10 kg	4.20 kg	8.40 kg	21.00 kg
80 ppm	240.00 g	2.40 kg	4.80 kg	9.60 kg	24.00 kg
90 ppm	270.00 g	2.70 kg	5.40 kg	10.80 kg	27.00 kg
100 ppm	300.00 g	3.00 kg	6.00 kg	12.00 kg	30.00 kg

Decreasing calcium hardness is done by dilution

INCREASING TOTAL ALKALINITY
ADD: SODIUM BICARBONATE (BAKING SODA)

METRIC TABLE
Litres of Pool Water

Required Increase in ppm	2,0001	20,0001	40,0001	80,0001	200,000	40,0001
10 ppm	36.0 g	360.00 g	720.00 g	1.44 kg	3.60 kg	7.19 kg
20 ppm	72.0 g	720.00 g	1.44 kg	2.88 kg	7.20 kg	14.40 kg
30 ppm	108.0 g	1.08 kg	2.16 kg	4.32 kg	10.80kg	21.60 kg
40 ppm	144.0 g	1.44 kg	2.88 kg	5.76 kg	14.40kg	28.80 kg
50 ppm	180.0 g	1.80 kg	3.59 kg	7.18 kg	18.00kg	35.90 kg
60 ppm	216.0 g	2.16 kg	4.31 kg	8.62 kg	21.60kg	43.10 kg

70 ppm	252.0 g	2.52 kg	5.03 kg	10.10 kg	25.20kg	50.30 kg
80 ppm	288.0 g	2.88 kg	5.75 kg	11.50 kg	28.80kg	57.50 kg
90 ppm	324.0 g	3.24 kg	6.47 kg	12.90 kg	32.40kg	64.70 kg
100 ppm	360.0 g	3.60 kg	7.19 kg	14.40 kg	36.00kg	71.90 kg

DECREASING TOTAL ALKALINITY
ADDING MURIATIC ACID

METRIC TABLE
Litres of Pool Water

Required Increase in ppm	2,0001	20,0001	40,0001	80,0001	200,0001	400,0001
10 ppm	32.5 ml	325.00ml	650.00ml	1.30 l	3.25 l	6.50 l
20 ppm	65.0 ml	650.00ml	1.30 l	2.60 l	6.50 l	13.00 l
30 ppm	97.5 ml	975.0 ml	1.95 l	3.90 l	9.75 l	19.50 l
40 ppm	130.0 ml	1.30 l	2.60 l	5.20 l	13.00 l	26.00 l
50 Ppm	163.0 ml	1.63 l	3.26 l	6.52 l	16.30 l	32.50 l
60 ppm	195.0 ml	1.95 l	3.90 1	7.80 l	19.50 l	39.00 l
70 ppm	228.0 ml	2.28 l	4.56 l	9.12 l	22.80 l	45.50 l
80 ppm	260.0 ml	2.60 l	5.20 l	10.40 l	26.00 l	52.00 l
90 ppm	293.0 ml	2.93 l	5.86 l	11.70 l	29.30 l	58.50 l
100 ppm	325.0 ml	3.25 l	6.50 l	13.00 l	32.50 l	65.00 l

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