

## ChlorFree Global Well Systems

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ChlorFree Global Potable Well Systems can operate either in a sediment collection tank environment or be placed directly into the well below the submersible pump. This document will explain both in detail. ChlorFree Global Potable Well Systems (referred to as CFG in this paper) are highly efficient and need to be replaced only every 24 months. We suggest our customers contract an independent water quality control laboratory to take samples of the well before treatment and again every two weeks for one month. When the initial testing is complete, we will ask for the results to compare individual results with that of our independent testing. The initial laboratory testing will provide us with the type and amount of contamination we are dealing with, and with that information, we can design and build a system to meet those needs. The four factors of information that are required to design and build the system are:

#### Four factors for potable water systems

1. pH
2. Bacteria level or other contaminants
3. Tank volume
4. Usage per day

#### Three factors for in-ground well systems

Note; In a well environment, we will use the flow per min to calculate the formula with

1. pH
2. Bacteria level or other contaminants
3. Flow per day

The above information is necessary in order for us to design and build the correct system to solve the problems of the contamination.

#### How it works

The proprietary ChlorFree Global™ ionizing system uses small quantities of interactive ion-producing elements of carefully balanced minerals (silver, copper, zinc, carbon, and palladium) which, when submerged in (fresh) water, release positively charged sub-atomic particles that consequently charge each water molecule by an electrochemical process commonly known as electrolysis or galvanic action. Concentrated (safe) levels of these positively charged particles seek out and destroy harmful micro-organisms, as well as attract dirt, dust and metal contaminants such as iron, while coagulating and precipitating these molecules to the bottom of the water. This process produces a crystal clear, bacteria-, virus-, and algae-free environment.

Archeological excavations show that people have been using copper for more than 11, 000 years and have been using silver for more than 5,000 years. Copper can be easily extracted and processed. Over 7,000 years ago, people developed an extraction mechanism for copper ores. The Roman Empire gained most of its copper from Cyprus, the isle that gave copper its name. Nowadays copper is mainly extracted from ores, such as cuprite ( $\text{CuO}_2$ ), tenorite ( $\text{CuO}$ ), malachite ( $\text{CuO}_3 \cdot \text{Cu}(\text{OH})_2$ ), chalcocite ( $\text{Cu}_2\text{S}$ ), covelite ( $\text{CuS}$ ) and bornite ( $\text{Cu}_6\text{FeS}_4$ ). Large

deposits of copper ores have been found throughout the US, Chile, Zambia, Zaire, Peru, and Canada.

Silver can be obtained from pure deposits, from silver ores such as argenite ( $\text{Ag}_2\text{S}$ ) and horn silver ( $\text{AgCl}$ ) and combined with ore deposits that contain lead, gold or copper. Both copper and silver have been applied for centuries as biocides. The Vikings used copper strings on their ships to prevent the growth of algae and barnacles. Modern ships still use the same technology. Most anti-fouling paints contain copper, reducing the number of marine species growing on the hulls of ships.

Because of this measure, ships can reach their destination faster. Nomads used silver coins to improve drinking water quality. Well water containing copper and silver ions is very bright, due to the biocidal effect of these metals. Since 1869 various publications have appeared on the disinfection properties of silver. Some European and Russian villages have been using silver for drinking water treatment for many years.

Copper-silver ionization was developed in both Europe and the United States in the 1950s.

### Common Questions we have encountered

Question: What is an ion?

Answer: Ions are positively charged atoms that seek out and destroy harmful bacteria, viruses, and algae. Ions also attract dirt, dust, debris, and metals like iron, and coagulate and attract suspended molecules. Then the precipitate falls to the bottom of the pool or water tank/reservoir. This constant cleaning process leaves your pool, spa, fountain or water tank crystal clear and bacterial free.

Question: What is ionization?

Answer: The release of silver and copper ions.

Question: How does ionization work?

Answer: A safe, low-voltage self-generating current is applied to the silver and copper electrodes. As the ions attempt to move from one electrode to the other, many of them become suspended in the water.

Question: How does silver / copper ionization purify water?

Answer: Copper ions have the ability to pierce the protective outer membrane of a cell and disrupt enzyme balance thereby killing algae. Silver is effective because of its capabilities of interfering with DNA production and accelerating the death phase of bacteria and viruses. Although lethal to bacteria and algae, this process is completely safe for humans. A multitude of scientific tests have been done proving the effectiveness of copper silver ion systems in spa applications. Experimentation at the University of Arizona proves that such mineral ions, in conjunction with trace chlorine are 1,000 times more effective against algae than chlorine alone. Today, the use of these metals is widespread and highly advanced as is the equipment used to produce them for water treatment.

Question: Is ionization all that you need for your water?

Answer: Silver and copper ionization completely purifies water. It is usually necessary to add a small amount of an oxidizing agent (chlorine or non-chlorine shock) periodically to help break down excess organic debris, and oils.

Question: Is ionization safe?

Answer: Not only is it safe, but the minerals used for water purification are recognized as essential minerals to the body.

Question: How is ionization safer than chemicals?

Answer: Most, if not all of the chemicals used to purify water are caustic and or toxic, of which, many are now considered to be carcinogenic.

Question: How is ionization better than chemicals?

Answer: The need for high levels of chemicals is eliminated. Also eliminated are the strong chemical odors, damaging effects on hair, skin, fabrics, liners, and equipment.

Question: What are the operational costs of ionization?

Answer: The ChlorFree System contains five Minerals: silver, copper, zinc, carbon and palladium and lasts for 1 full year; it which simply needs to be replaced once a year and in certain applications, once every 2 years.

Question: How often will I have to test the water?

Answer: You will need to test the ion level every few weeks and maintain proper water balance. The ion system is pH neutral, so it will not change your water balance like chemicals do.

Question: How are copper-silver ions produced?

Answer: Copper-silver ionization is brought about by electrolysis. An electric current is created through copper-silver, causing positively charged copper and silver ions to form. Copper-silver ionization brings us back to basic chemistry, an ion or an electrically charged atom, has a positive charge when it gives up an electron and a negative charge when it takes up an electron. A positively charged ion is called a cation and a negatively charged ion is called an anion. During ionization, atoms turn into cations or anions. When copper-silver ionization is applied, positively charged copper ( $\text{Cu}^+$  and  $\text{Cu}^{2+}$ ) and silver ( $\text{Ag}^+$ ) ions are formed. The electrodes are placed close together. The water that is disinfected flows past the electrodes. An electric current is created, causing the outer atoms of the electrodes to lose an electron and become positively charged. The larger part of the ions flow away through the water, before reaching the opposite electrode. Generally the amount of silver ions at a copper ion rate of 0,15 to 0, 40 ppm lie between 5 and 50 ppb. The ion concentration is determined by the water flow. The number of ions that is released increases when electric charges are higher. When copper ions ( $\text{Cu}^+$ ) dissolve in water, they are oxidized immediately to form  $\text{Cu}^{2+}$  ions. Copper can be found in the water in free form. It commonly bonds to water particles. Copper ( $\text{Cu}^+$ ) ions are unstable in water, unless a stabilizing ligand is present.

Question: What are the applications of copper-silver ionization?

Answer: Copper-silver ionization is suitable for a large number of applications. It became of interest when NASA used copper-silver ionization for drinking water production aboard Apollo

space ships in 1960. The ion generator that was used was the size of a matchbox. Because of copper-silver ionization, drinking water could be produced safely in space without the use of chlorine.

### Benefits

1. Copper/silver elements eliminate the following: algae, bacteria, and viruses (Note: With all viruses we have encountered in the testing of the system, CFG has been able to design and build a system to eliminate all viruses including E coli).
2. Ideal for those who are allergic or sensitive to standard sanitizing chemicals
3. Dramatic difference in water quality
4. Pump time for maintenance is doubled
5. Piping and valves PLC is doubled with the no corrosion factor
6. Eliminates chemical odors
7. Reduces maintenance time
8. System is environmentally friendly and completely safe
9. Provides long-lasting and constant purification of water contaminates with a residual effect of one year and in some applications up to 24 months.

### Benefit Summary

Copper-silver ionization affectively deactivates Legionella bacteria and biofilm, and it improves water quality. Copper-silver ionization has a larger residual effect than most other disinfectants. Copper and silver ions remain in the water for a long period of time. Because of its local affectivity, the effect is larger than that of UV. Copper-silver is effective throughout the entire water system, even in dead-end points and parts of the system that contain slow-running water. Copper-silver use affectivity does not depend on water temperature. When copper-silver is used, less maintenance to the water system is required. Copper-silver is non-corrosive; it causes less strain on the distribution system. Because of a decrease in the use of chemicals, the lids and pumps are not affected. Furthermore, shower heads, tanks, and taps are not contaminated. When copper-silver ionization is applied, there are no transport and storage difficulties.

Drawbacks: Copper-silver affectivity depends on the pH value of the water. At a pH value of 9, only one-tenth of all Legionella bacteria are removed. When dissolved solid concentrations are high, silver will precipitate. This means silver ions are no longer available for disinfection. Silver ions easily react with chlorines and nitrates that are present in the water, causing them to no longer be effective. Some species of microorganisms can become resistant to silver ions. They can remove metal from their systems or convert it to a less toxic product. These microorganisms can become resistant to copper-silver ionization. Although it is suggested that Legionella bacteria can develop resistance to copper-silver ionization, this disinfectant still appears to be effective for Legionella deactivation. To effectively kill pathogenic microorganisms, copper and silver ions should be present in the entire water system. When the system is used little and the water flow is quite slow, or when there are dead-end points in the system, this can causes problems for disinfection.

Legislation for copper-silver ionization:

EU: The European Union does not dictate any standards considering silver concentrations in the

water. Copper, however, has a maximum value of 20 µg/L, because it corrodes waterworks. Copper concentrations should be measured in taps. (EU Drinking water directive 98/83/EC, 1998)

WHO: The WHO does not dictate any standards considering the concentration of silver as a drinking water disinfectant, because the organization found the available data to be insufficient to recommend a health standard. (WHO, Guidelines drinking water quality, 3e editie)

USA: The United States dictate's a maximum value of 1 mg/L of copper and a maximum value of 0, 1 mg/L of silver. (EPA, National Secondary Drinking Water regulations, 2002)

### Installation options for placement

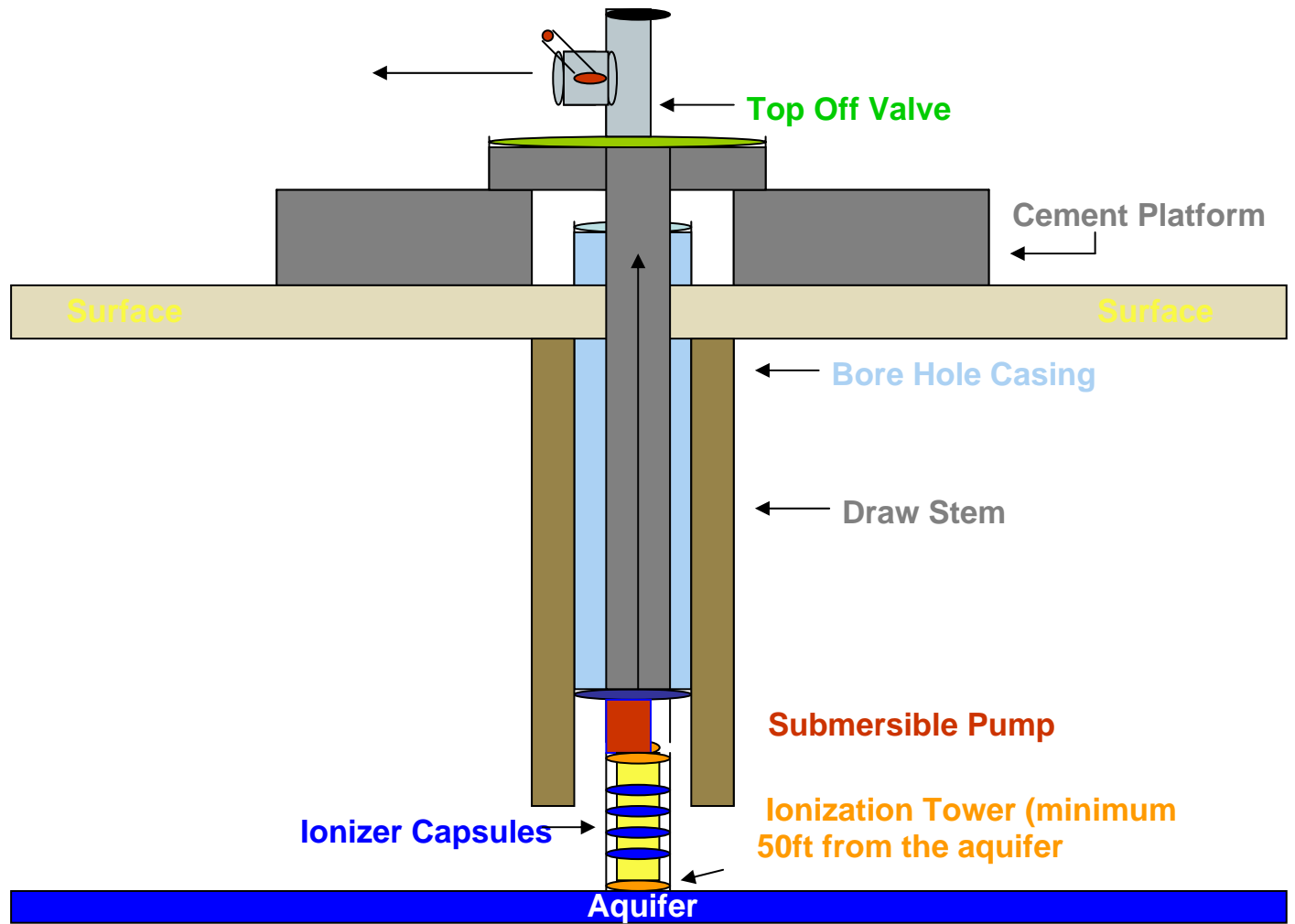
#### Option one

In this diagram we will illustrate the optimal positioning of the ChlorFree Global Potable Water Well System. This option will allow all the unwanted minerals and sediment to coagulate to the positively charged ions and become a heavier than water molecule and descend to the bottom of the sediment tank. The bacteria and viruses that are eliminated will dissipate and be collected in the discharged sediment at the bottom of the tank.

### ChlorFree In-Ground Potable Water Well System Illustration Diagram

#### Well Layout

Diagram 1 illustrates the most common water producing wells throughout the world today. Keep in mind that there will be minor variations regarding the pump, casing, borehole, depth, etc. If the bore-hole is at a depth greater than 4 meters it will be beneficial to contract a well service company to assist you in the installation of the CFG System. A typical bore-hole well consists of the following configuration. A well will be drilled out in accordance to a water surveyor. Once the bore-hole is complete the quality of the water and the well flow will be evaluated. Once the well has been certified to maintain potable quality water standards and desired flow, the well will enter the Completion Stage. The bore hole casing will be installed; this casing will consist of one of the following sizes: 5' older wells will have this size, 7', 8', 10', 12'. The outer casing will be cemented in, and the cement will be bored out after it has set. The next stage will be, to place the submersible pump at bottom of the casing with the ChlorFree Global System secured from the top of the Platform then lowered to approximately 3-4 meters below the pump or Draw Stem. The ChlorFree Global System (tower) will need to be positioned at a minimum of fifty feet above the aquifer so that the ions are not pulled into the aquifer... Be sure the ChlorFree Global System is lowered 3-4 meters below the submersible pump.



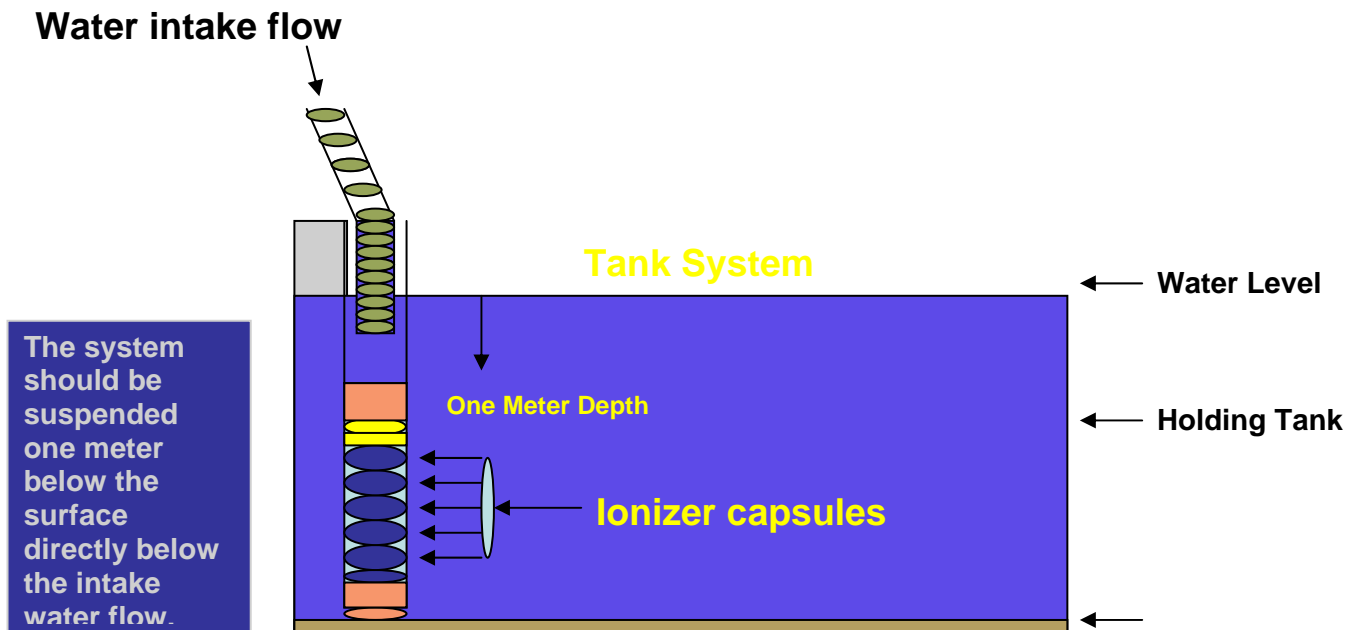
ChlorFree Global Potable Water Tank System

Option two

## Sediment Tank System

In this option, we will install the ChlorFree Global System directly into to the Sediment (primary) tank. In order for this to work correctly, we need to have some degree of agitation and circulation. The ChlorFree Global System will need to be placed one meter below the lowest water line point and close to the intake water flow. Allow a minimum of twenty-four hours for the ChlorFree Global System to activate. At this point, the ChlorFree Global System will initiate the production/secretion of IONS throughout the volume of water. This process will take a matter of only a few days depending on the level of contamination the ChlorFree Global System is purifying. In the diagram below, it illustrates the correct configuration to install the ChlorFree System. The factors that are necessary to be considered are:

1. Placement: One meter below the surface water and directly underneath the in-take flow
2. Agitation of water
3. Circulation of water
4. Sediment settling or time for coagulation of heavy metals or dust particles



## Summary

The ChlorFree Potable Water Well System performs at maximum efficiency when all the data collection is accurate and conducted by a Certified or credible laboratory. We, at ChlorFree Global require the results to be accurate in-order for us to design and build the ChlorFree Global System according to each individual installation. The CFG System has been proven to be successful at eliminating Bacteria, Viruses, Dust Particles, Heavy Metals, and deliver a quality of water that people have never experienced before. We have been cleaning water for people to drink for the past six years. ChlorFree Global System does not remove Chemicals. In these cases we can work in conjunction with a Carbon Filtration System to remove the chemical before the ChlorFree System ionizes the water. The ChlorFree Global Ionization Systems can be used in conjunction and provide a synergistic solution with other methods of sanitation including, chlorine, ozone ultraviolet, and chemical systems for improved performance as a supplemental or dual stage method of sanitation.

The ChlorFree Global System is the only system on the market today that can offer the cleaning and purification of water with a residual life span of one year without the use of chemicals. The ChlorFree Global System will reduce the costs of cleaning and treating water in almost every category. The ChlorFree Global Team is a World Class Operation with a 7-Year Proven Technology. Satisfaction and Quality are our Highest Priority in order to design and build a Water Purification Solution for almost any water related problem from inception to completion.

Our ChlorFree H2O-System has been Tested, “Safe for Human Consumption”, please refer to our EPA Certification (EPA Certification Number: 075702-CRI-00) as well as our 6-year History with Flamingo Beach Community which produces 1,300,000-gallons of Purified ‘ChlorFree’ Water every day (<http://chlorfreeglobal.com>).

ChlorFree Potable Water Certification Number from the Country of Costa Rica:  
Ministerio de Salud de Costa Rica  
Decreto# 4582-06

We at ChlorFree Global promise to provide each of our customers with clean, safe, healthy, and affordable water. We welcome you to enjoy the many benefits as the future of our success depends on your success.