



## *RELIABLE AND ALTERNATIVE ENERGY SOLUTIONS WITH NON-CHEMICAL WATER TREATMENT SYSTEMS*

It is a well-known fact that there are many poor products and firms in the water treatment industry, especially so in the non-chemical industry. This fact sheet will elaborate and hopefully make clear what the Scale Free System (SFS) is and how we compare to other providers in the non-chemical water treatment industry.

### **What is Scale Free Systems??**

The Scale Free System (SFS) is the best choice for non-chemical/chemical-free water treatment for your cooling towers or evaporative condensers. SFS a unique environmentally responsible “green” alternative to water treatment that prevents and reverses scale formation for all heat transfer systems without the use of chemicals. SFS utilizes “system neutralization” technology to provide chemical-free water treatment with no harmful by-products.

SFS is a cost-effective, unique solution that reduces future maintenance time and costs. It also reduces daily operating and maintenance costs associated with the shipping, handling and disposal of chemicals. You will also see significant water use savings associated with the use of our system. SFS will extend the life and improve the efficiency of your equipment. SFS is a unique, progressive design solution that will bring optimal efficiency to your operation.

We realize that the proper treatment of water in industrial heat transfer systems (cooling towers, condensers, boilers, chillers) is an essential part of process operations. Your operations and continuity stream can be adversely affected by scale, corrosion, fouling and microbiological contamination. A well designed and consistently maintained water treatment program will help to ensure efficient system operation while maximizing the equipment’s service life. If not done properly, adverse issues with water treatment programs can be very costly with heat transfer loss in the cooling tower, equipment failure, and health and safety concerns.

### **Why Utilize a Non-Chemical Water Treatment Program??**

Recently, there has been a resurgence of interest and adoption of technologies that treat cooling tower water without the use of chemicals. Trends in the marketplace are pushing commercial and industrial owners and operators to look for new solutions to reduce energy and water consumption. These include:

- Rising Energy Costs - Cooling system operation represents approximately 12% of a commercial building’s operating costs. With rising energy prices, the spotlight is on more efficient HVAC.

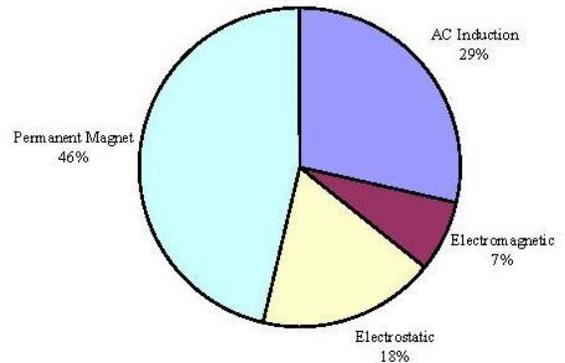
Poor water treatment can quickly reduce operating efficiency as much as 25%, making water treatment a critical component of an efficient cooling system operation.

- Water Usage – A proper non-chemical water treatment system can significantly reduce water consumption by dramatically increasing the cycles of concentration through the system over what a chemical treatment program can achieve. The more cycles of concentration that you have, the less water you consume, so the object of water treatment is to achieve the maximum cycles of concentration without causing deposits to form in the system.
- Environmental - Mandatory government regulations and other environmental regulations are driving the demand for environmentally friendly water treatment. Environmental standards groups such as LEED are encouraging facility owners to implement changes that positively impact the environment and the bottom-line.
- Employee and Public Safety - Facility owners and managers are increasingly aware of the safety and liability risks/costs associated with the storage and handling of water treatment chemicals on-site.

A growing dissatisfaction with existing chemical solutions and for the reasons listed above, eliminating chemicals in the water treatment process is becoming an appealing thought to many facility owners, managers and operators.

### **What sets Scale Free Systems apart from other Non-Chemical Water Treatment Technologies??**

Before we decided to market our system on a national level, we did a lot of research into the history of the non-chemical industry and the products associated with it. We know that there are a lot of other non-chemical technologies out there that make much of the same claims that we do. They vary from magnetic (permanent magnets), electromagnetic (using DC current), electrostatic, AC Induction, electro-ionization, ozone and depressurization/kinetic energy. Figure 1 shows the makeup of current devices on the market today. A brief review of the three most popular:



- Permanent Magnet - Magnetic water treatment devices are the oldest of the three major categories of devices on the market. The use of magnets for water treatment appears simple. The application requires a magnet (permanent or electrically induced) placed in or around a non-magnetizable pipe. The water to be treated flows through the pipe. Manufacturers claim that the magnetic flux through which the water supersaturated with calcium flows alters the water or particles and induces bulk water crystallization of calcium carbonate. The empirical evidence of treatment is claimed to be the formation of a “softer” scale, i.e. a scale that is easily suspended and removed in the bleed stream. There appears to be general agreement among the manufacturers that the device only works with calcium carbonate or calcium sulfate precipitation, but not with silica-based precipitates. Scientific laboratory

studies have concluded that “in some cases, magnetic water treatment can exert significant scale-inhibiting effects”. However, they also conclude that “the application of this scale-inhibiting effect over differing field conditions is very difficult to replicate. The devices work in only optimum operating conditions with respect to makeup water, magnetic field strength, orientation, treatment time, and fluid flow velocity”. These types of devices are only effective when fluid flow is orthogonal to the magnetic field and exposure to the field is prolonged or the solution is recirculated.

- **Electrostatic Water Treatment** - In a typical electrostatic water treatment system, a cylindrical electrode with an insulating coating on the outer surface is positively charged with a high positive voltage (e.g. up to 30,000 volts) but a low current. This electrode is placed at the center of an externally grounded cylindrical metal housing and the water to be treated flows in the annulus between the housing and the electrode. Manufacturers claim that an electrostatic field suitably impressed across a section of flowing water will suspend (especially colloidal size) particles between the walls of the piping network thus reducing the tendency to form flow restricting deposits. Scientific laboratory studies have concluded that “in most conditions, the electric field is greatly compressed to a fraction of an inch surrounding the electrode rather than extending into the solution as suggested, thus very little of the solution and the suspended particles flowing past the electrode will be exposed to the strong electric field. The evidence cited by manufacturers is anecdotal, provided as testimonials or case histories with minimal data that would allow an evaluation of the effects of other variables such as changes in water chemistry, temperature, system load and other operating conditions.”
- **Alternating Current (AC) Induction** - AC induction methods treat scale-forming water by exposure to an energized solenoid cable wrapped around pipe. While similar to DC electromagnets, these systems have two distinct characteristics; 1) a lack of contact with the treated solution (wires are wrapped around or near the pipe) and 2) voltage on the coils are varied quickly (in the hertz (Hz) to megahertz (MHz) frequencies) and sometimes in very complex ways. Manufacturer’s claims are similar to the permanent magnet and electrostatic devices: the transformation of calcium carbonate crystal form to a non-scaling type (presumably aragonite) and/or the reduction in scale forming tendency of the water. There is no lab data available to support a claim that these devices promote scale inhibition, de-scaling or reduces the biological populations.

As evidenced by the popularity of some of the marketed devices that fall into one of the three categories above, they can be effective in limited situations. Unfortunately, there are just as many devices that have completely failed or the results did not meet the claims of the seller or expectations of the buyer. This has led to a general dismissal of the non-chemical approach for the treatment of water. The primary reasons for the failures are that many manufacturers overstated savings and performance claims. When water conditions and chemistry, which vary greatly from location to location, were right, their systems worked. When the same system was applied to another location with different water chemistry, it did not work because of wide variations in site conditions and intake water.

There are some major differences between SFS and all of the other non-chemical devices out there. ***First and foremost, through the science of physics, we utilize “system neutralization” technology by treating your equipment...not the water.*** SFS does not try to change or alter the water chemistry in any way. SFS applies the science of physics, rather than water chemistry to eliminate scale, corrosion, and other harmful effects of hard water in heat exchange equipment. When water is subjected to temperature change (delta T), pressure change (delta P), friction and turbulence, dissolved minerals, primarily calcium carbonate (CaCO<sub>3</sub>) and magnesium carbonate (MgCO<sub>3</sub>), will precipitate out of solution and deposit on heat transfer surfaces of plumbing systems and equipment in the form of a rock-like buildup, commonly called lime/scale. At the molecular level, the positively charged ions of these minerals are attracted to the negatively charged surfaces of the pipes and equipment. The attraction of the charged ions causes them to bond tightly together with one another, thus forming the lime/scale deposit known as calcite. These mineral deposits act as a great insulator and require more energy to produce the heat exchange processes required from the equipment.

In its simplest terms, the SFS neutralizes the pipes and equipment to the same polarity as the ions in the water. The Scale Free System provides an engineered application to pull the dynamic electrical energy out of the water, through a control panel that modulates and controls the energy flow and ultimately out to an independent grounding system. Without the attraction to move and plate to the negative surface of the equipment, the dissolved mineral molecules remain in a physical state of suspension and with regular conductivity control; the suspended minerals will be disposed of through automatic blow down.

SFS's effectiveness of scale, biological and corrosion control is not limited to makeup water with a low level of minerals such as calcium carbonate and silica. We guarantee SFS will perform under all conditions of makeup water that will be encountered.

### **Scale Free Systems Successes...and Setbacks**

The SFS system has a proven track record of success and has garnered nothing but praise from those who have installed the system on their equipment over the last ten years. The system is installed in all types of industries (food, hospitality, educational, healthcare, and commercial/industrial) around the world and each installation is designed to meet individual needs.

The successes we see with our system today did not come without some setbacks. The technology of the Scale Free System was originally developed over thirty years ago and culminated with the first Scale Free System installation in 1992. In the early years of the system, there were some setbacks and learned lessons throughout the experimental process. Setbacks should not be viewed as failures. On the contrary, a setback is something that we use to our benefit; to increase our resolve, to make our product better, and to bring us closer to success than we ever might have gotten had we not faced the setback in the first place. In fact, setbacks and failures are crucial to the learning process.

That is why true, breakthrough innovation is so extraordinarily hard to achieve. It requires an organization with the resolve to do what sometimes feels unnatural: explore, experiment and make mistakes. It is how we learn from that process and make our product even better than it was before.

Since our debut, the Scale Free System has been subsequently improved and redesigned over the years by an engineering team dedicated to providing a non-chemical solution for water treatment. We will always strive to utilize technical innovation and an excellent product development process to improve upon what we feel is the best non-chemical system on the market today.

SFS has had many successes over the last 10+ years and has garnered the respect and praise of our customers by providing a first class water treatment program. We will always strive to give our customers the best water treatment program possible. We believe the partnership we form with our customers creates a trust that we will always be there for them and makes us both stewards of the program. This unprecedented collaboration creates a dedicated team approach to providing a non-chemical solution for water treatment, streamlined service, and truly sustainable methods. I have attached a project profile of the SFS installation at BJC Hospital in St. Peter's, Missouri. When SFS was called to give a presentation to the Board at BJC, Randy Earp, the facility manager at BJC was dead set against having our system installed. He had gone through a period with the Dolphin by Clearwater Systems (an AC Induction system) installed at the hospital. It was so ineffective, that they removed it and went back to using chemicals. The Board was determined to search out for a non-chemical technology that would be beneficial to their operation and be environmentally friendly. Against Randy's objections, SFS was installed for a one season trial period. By seasons end, Randy had made a complete reversal of his feelings about SFS and has been supportive in trying to get SFS installed on all sixteen of BJC campuses.

### **Want more proof?**

Please visit our website at <http://www.scalefreeintl.com/> for testimonial videos from some of our related customers. Sometimes you just have to see for yourself.

Additionally, we frequently invite and make arrangements for potential customers to take a tour of any facility that the Scale Free System is currently in operation. This allows you to talk to the people firsthand who are using SFS on their equipment. We believe that you will witness Scale Free's simple, elegant design, installation, and operation that provides superior performance, increased reliability and reduced operating costs.