

## **Treatment Considerations For Open Evaporative Cooling Water Systems Using Chemical, Physical, Physical-Chemical & Non-Chemical Technologies**

As of 1/9/2015

This document has been prepared by the AWT Technical Committee's Cooling Subcommittee and Special Projects Subcommittee. The first section is an introduction to the two sections that follow and referenced herein as:

- Physical and Physical-Chemical Water Treatment Devices.
- Non-Chemical Water Treatment Devices.

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### **Objective and Goals**

Open evaporative cooling systems present many challenging problems related to operating environment, system design and metallurgy, and quality of the water supply(s) used for cooling tower makeup.

The thorough objective of cooling water management is to obtain safe, reliable, effective, and economic operation of cooling water systems in compliance with environmental regulations. The primary goals to reach this objective include the following:

- Inhibit all system metallurgies against corrosion.
- Control microbiological growths that can contribute to corrosion and deposit Formations (prevent biofilm and MIC) and hygiene risks (*Legionella* and other pathogens).
- Prevent scale formation and inhibit deposit and biofouling accumulations, which adversely affect heat transfer and elevate energy consumption and costs.
- Operate in a safe and environmentally responsible manner in compliance with all environmental regulations.
- Minimize use of water and energy resources.

**Accomplishing ALL of the above should aid a facility to receive the maximum potential water related LEED points available.**

## **Chemical Treatments**

There are hundreds of different chemicals and thousands of chemical combinations available to effectively treat cooling tower condenser water systems operated with a very wide range of makeup water chemistries. They can achieve all of the goals referenced above when properly applied by a knowledgeable and experienced water treatment professional. Chemical programs are frequently enhanced by incorporating side stream filtration and/or another physical or physical-chemical water treatment process.

Chemical treatments control corrosion of system metallurgies, maintain clean heat transfer surfaces and control microbiological growths. A detailed description of the chemical treatment of cooling water is beyond the scope of this effort. There are clear divisions of physical, physical-chemical and non-chemical treatment efforts.

1. Treatments and equipment which function within clearly defined and reproducible scientific laws and procedures, and which yield consistently reproducible results, are termed (within this document), Physical and Physical-Chemical Treatments.
2. Treatments which function outside of generally accepted scientific laws, do not yield consistently reproducible results, and where performance claims are based on testimonials and not factual and effective water treatment case histories, are termed (within this document), Non-Chemical Devices.

The terms used to describe the action, or function of the process have been described and used to perform internet searches. The results of these searches are described to suggest performance expectation or explain the processes when using these methods. Each search also reveals several active suppliers of equipment available to accomplish the function. Some specific literature references found are included for consideration.

The most effective programs to best protect the complete cooling water system may incorporate a coordinated combination of both physical and chemical processes. The goal of water treatment professionals is to select the most cost effective, environmentally safe, approach for the chemistry of the water supply available and operation of the water system in question. To best accomplish this goal most cost effectively, the water treatment professional must avoid use of chemicals and processes that are not needed. He must evaluate all supplier claims and insist on factual information supported by viable case histories that support those claims.

## **Physical and Physical-Chemical Water Treatments / Non-Chemical Devices**

The two sections that follow are entitled:

- AWT listing of Physical and Physical-Chemical Water Treatment Devices.
- AWT listing of Non-Chemical Devices, A Mode of Operations Summary and a Identified Suppliers Listing

AWT has published a "Selection Guide for Successful Cooling Water Treatment Programs". The Cooling Water Resources section of the AWT website also includes a document entitled "Informative and Factual Case Histories for Cooling Water Treatment Programs". These may act as criteria for a water treatment professional to evaluate possible alternatives. Many water treatment claims made by NCD suppliers, including most Pro-NCD literature papers and case histories do not follow these criteria.

## **Acknowledgements**

This document and the two referenced herein have been produced by the AWT Cooling and Special Projects Subcommittees of the AWT Technical Committee. The Committee Chairs, Task Group Chairs and Task Group Contributors included the following individuals in alphabetical order.

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## **Physical and Physical-Chemical Water Treatment Devices**

This section has been developed through the efforts and input of many AWT Technical Committee members and includes information compiled from previously published sources. It is not meant to be complete, either at the time of publication, or in the future, but is intended as an ongoing, living document. This listing of Physical and Physical-Chemical Water Treatment methods, which are Non-Chemical and Chemical Devices, equipment or technology, can be clearly and scientifically documented to show true performance. The AWT Technical Committee-Special Projects Sub-Committee will be periodically reviewing and updating this listing to add technologies as they evolve.

### **Introduction**

The various types and forms of physical and physical chemical devices, and descriptions of their operating parameters may be easily located with simple internet searches. These searches will lead to many individual companies producing operating equipment. Usually a Wikipedia description of the process or available equipment will also be displayed.

Below are terms and processes which have strong scientific principles, laws, and rules governing their operation and performance. First, an alphabetical listing of the processes and functions described.

- Aeration
- Cathodic Protection
- Centrifugal Separators (Cyclone)
- Deaerators
- Distillation
- Electrodialysis
- Electrolytic dissociation of brines to produce halogens.
- Filtration
- Flotation
- Inclined Plate Clarifiers
- Ion Exchange
- Ozone Generation
- Settling Basins
- Silver Copper Ionizing Devices
- Spray Pond Systems
- Ultraviolet light Generation

## Aeration

**aer·ate** <sup>4</sup> (âr'āt)

*tr.v.* **aer·at·ed, aer·at·ing, aer·ates**

**1.** To supply with air or expose to the circulation of air:

Aeration, by whatever means, is intended to do one of two things. Either use air to sweep dissolved gasses, or light liquids from a water system, or to chemically oxidize other dissolved or suspended compounds to remove and/or destroy them in the treated waters.

Access to many diverse suppliers may be had by searching the Internet with the term **Aeration**.

## Cathodic Protection

**Cathodic protection (CP)** is a technique used to control the corrosion of a metal surface by making it the cathode of an electrochemical cell. The simplest method to apply CP is by connecting the metal to be protected with another more easily corroded "sacrificial metal" to act as the anode of the electrochemical cell. Cathodic protection systems are used to protect a wide range of metallic structures in various environments.

Sacrificial anodes are constructed of metals more corrosive in the galvanic series than the metal to be protected. Where steel is being protected, zinc is normally used, but aluminum, or magnesium may be selected. Each anode has a range of effectiveness and area protected, so that the placement of the sacrificial anodes is done so that the areas of effectiveness overlap slightly to offer full surface protection.

The effective range of and effective life time of a sacrificial anode may be increased by impressing an electrical current into the anode, thus enhancing the installation and creating **Impressed Current Cathodic Protection**.

Access to many diverse suppliers may be had by searching the Internet with the term **Cathodic Protection**.

## Centrifugal Separators (Cyclone)

### Fundamentals of Centrifugal Separation Technology

#### Centrifugal force

Centrifugal separating technology utilizes fundamental physical laws and centrifugal force.

Centrifugal force is produced through rotation around an axis. The force generated through the rotation acts in an outward direction. Depending on the speed of the rotating body, it increases or drops on the circular path.

Mechanical separation technology makes use of this property when light, heavy or substances of different density have to be separated from each other.

Access to many diverse suppliers may be had by searching the Internet with the term **Centrifugal Separator**. If one follows this path to [www.pepfilters.com](http://www.pepfilters.com) (an AWT member company), and selects Technical Library and opens "General Filtration Overview", a basic discussion of the various modes of physical separation with filter media is available.

## **Deaerators**

The objective of a deaerator system is to reduce the dissolved oxygen in generally a steam boiler's feedwater. Two distinct types of equipment are available, tray and spray systems. In the Internet search, read the Wikipedia description for the two types for a basic understanding of the processes.

Internet term: Deaerator(s)

## **Distillation**

Distillation is the process of separating mixed liquids based upon their differing boiling points. The separation of hydrocarbon fractions by distillation is the basis for crude oil transformation into usable end products such as gasoline and motor oil. Basic gas distillation is the process used to separate the various gases in air, nitrogen, oxygen, hydrogen, helium, etc. Distillation is the process used to enhance the alcohol content of most liquors and prepare motor fuel alcohol.

Nearly every steam-powered vessel in the entire world navies and merchant fleets has a flash evaporator, which prepares distilled water from sea water for boiler feed.

Two Internet terms: Distillation process, Distillation Equipment.

## **Electrodialysis**

Electrodialysis uses an imposed electric field to drive ions through a membrane medium. It may be used to purify waters containing specific ions or metals, such as arsenic. It will also produce high purity water.

Internet term: Electrodialysis.

## **Electrolytic dissociation of brines to produce halogens**

The electrolysis of sodium chloride brine is a long used process to produce sodium hydroxide. One byproduct is Chlorine gas or sodium hypochlorite. If sodium bromide brine is used, a mixture of bromine, hypobromous acid, and sodium hypobromite may be produced. Either solution may be used for disinfection.

Internet search terms: Brine Electrolysis.

## **Filtration**

Filtration is the science and art of trapping various size and weight materials in a matrix which may be cleaned to regenerate the trapping ability of the matrix. However, as very inexpensive trapping materials, such as fiber mesh for air filters and wound coils for cartridge filters are available, replacement is usually cheaper and less labor intensive than cleaning. Again pepfilters.com, cited in centrifugal separators, offers an excellent starting point for understanding filtration.

A list of many of the types of filters encountered is shown below.

- Screen mesh
- Fiber mesh
- Cartridge filters
- Socks
- Media filters
  - Sand filters
  - Graded gravel filters
  - Green sand filters (Prepared with an oxidizing agent, usually potassium permanganate)
- Membrane filters
  - Nano Filtration
  - Ultra Filtration
  - Reverse Osmosis

Each step in the filter requirements moving from removing limbs and branches for a major water intake filter to micro size particles in media filters to dissolved ions in the membrane filters progresses in an ever decreasing size of materials trapped and removed.

Internet search terms: Filter, Filtration.

## **Flotation**

Flotation is a process whereby fine particles or suspended organic compounds are separated from water by the injection of induced air or dissolved air into the mixture and allowing the resultant bubble-desired compound complex to float to the surface of the mixture and be separated by physical removal. The process is widely used for separation of oily wastes and concentration of mineral ores. The usefulness of the process goes back to the 1800's in the mining industry.

For each process there are individual system flow rates, air injection rates and binding surfactant or polymer coagulant ratios which must be ascertained to optimize system performance.

Internet search terms: Flotation, Flotation Equipment.

## **Inclined Plate Clarifiers**

Inclined plate clarifiers and tube clarifiers are innovative technologies that increase basin settling area by creating an inclined settling surface. Overall plant footprint can be reduced by up to 90% using these technologies.

Inclined plate clarifiers and tube clarifiers provide a large settling area for suspended solids in considerably less space than do conventional gravity circular clarifiers.

Systems range in capacity from 15 gpm to several mgd, using multiple units. Units utilize minimal floor space, provide for low maintenance, installation and capital costs.

An Internet search using the terms Inclined Plate Clarifier yields several current equipment suppliers.

## **Ion Exchange**

Ion exchange is a process for exchanging an undesirable ion for a desirable one. This is accomplished using an exchange medium. Many mediums are available for special purposes, however, for water treatment purposes nearly all mediums are styrene based polymer matrixes. See Wikipedia "Ion Exchange" for a preliminary discussion of the ion exchange process.

Internet search terms: Ion Exchange, Ion Exchange Resins, Ion Exchange Equipment.

## **Ozone Generation**

Generated ozone is used for disinfection of microbiologically contaminated waters.

**Reference: "UFC 3-240-13FN 25 May 2005,**

**UNIFIED FACILITIES CRITERIA (UFC), INDUSTRIAL WATER TREATMENT OPERATION AND MAINTENANCE, states in section:**

### **8-2.9 Non-Traditional Water Treatment Chemical Devices**

8-2.9.1 **Ozone.** Ozone ( $O_3$ ) is a chemical gas consisting of three atoms of oxygen. It has been used in cooling tower water systems. Ozone is a very effective disinfectant for the control of aerobic bacteria and is somewhat effective for sessile bacteria. Ozone has been shown to have a limited and unpredictable effect on calcium carbonate scale. The scale that may form does not adhere to heat exchange equipment, but rather forms SS that can be removed with filtration. The performance envelope for prevention of calcium carbonate scale on heat exchange equipment is very limited and is much less than what is possible when using traditional chemical treatment. Ozone does not prevent corrosion of most metals. It provides some reduction of mild steel corrosion, but will increase the corrosion of copper at rates up to 10 times versus traditional chemical treatment. Ozone also attacks galvanized steel. Increasing the level of ozone in water increases the corrosiveness of the water. Levels of 0.1 mg/l or less are acceptable. Ozone has a short half-life and must be generated on-site. Ozone-generating equipment can have high capital costs. It is difficult to maintain an effective residual of ozone throughout the entire cooling water system because of the extreme reactivity of ozone. It is also very volatile and can be lost from the system as the water passes through the cooling water system, resulting in biomass within the tower fill."

Internet search terms: Ozone, Ozone Generators



## **Settling Basins**

Settling basins are just what the name implies, they are wide (usually fairly deep) spots in the line of flow which allow fine particles with a density greater than water to precipitate out of suspension. Precipitation may be accelerated by the addition of agents to reduce the suspending properties of the particles. Many, if not most setting basins are not chemically treated.

Internet search terms: Settling Basins

## **Silver Copper Ionizing Devices**

**Copper and Silver Ionizing Devices.** Copper and silver ionizing devices use copper and silver metal rods that are electrically corroded and thus put copper and silver ions in the cooling water. Copper and silver ions are known microbiocides. Both copper and silver ions are toxic to bacteria and algae. Performance envelopes are ambiguous. There is also a potential for the copper and silver ions to plate out on mild steel pipe, galvanized steel, and other metal surfaces, creating a galvanic corrosion cell and resulting in pitting corrosion. System fouling has been demonstrated in use.

Applications, particularly in hospitals for Legionella control, have demonstrated reduce efficacy with time.

Internet search terms: Silver Ionization, Copper Ionization.

## **Spray Pond Systems**

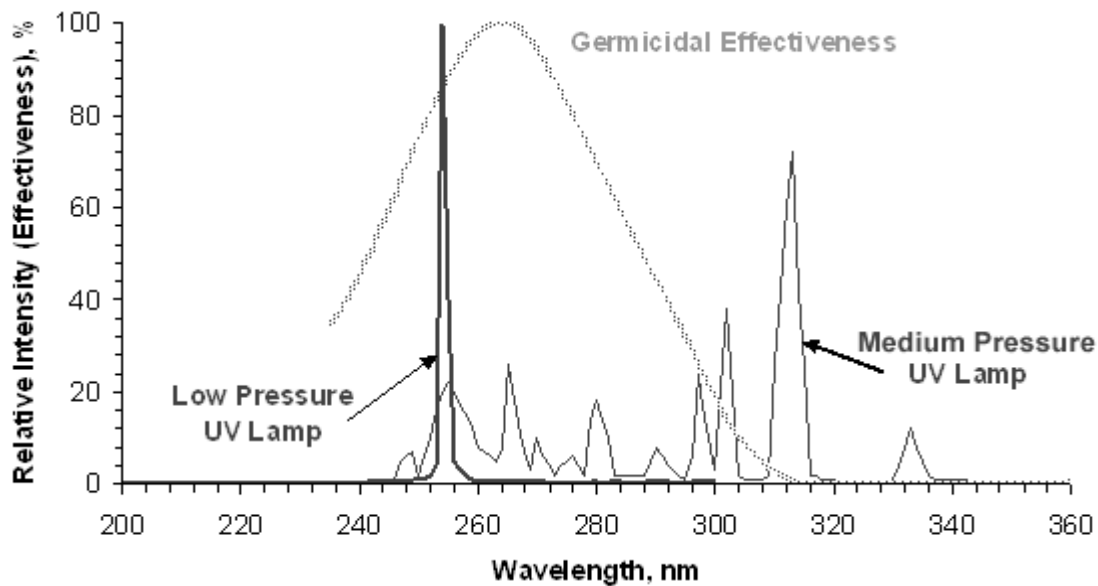
Spray ponds were one of the first attempts to mechanically cool recirculating cooling water. Water sprayed into the air evaporates and cools the spray droplet. The area of the pond and the number of spray nozzles required to achieve the desired or required cooling is the problem for the designing engineer.

Search terms: Spray Pond.

## **Ultraviolet light Generation**

For current practical purposed, all approved ultraviolet light generators are based on the emissions of an electric arc struck in the presence of mercury vapor.

Search terms: mercury vapor pressure.



Disinfection is obtained mostly from the 254-nm emission of a low-pressure lamp. Disinfection is the direct result and measured by the strength (intensity) of the light and the length of exposure. Different microbial populations require different exposure settings. The emphasis, at this time, in potable water applications is on protozoans, particularly *Giardia* and *Cryptosporidium*. Hundreds of millions of dollars are being spent throughout the US, at the direction of the EPA, to insure killing these two organisms.

Internet search terms: Ultraviolet Disinfection.

## **Non-Chemical Devices**

This section has been developed through the efforts and input of many AWT Technical Committee members and includes information compiled from previously published sources. It is not meant to be complete, either at the time of publication, or in the future, but is intended as an ongoing, living document. This listing of Non-Chemical water treatment Devices (NCD) is separated into six types of processes whose performance for water treatment has not been clearly and scientifically documented. The AWT Technical Committee-Cooling Water Sub-Committee will be periodically reviewing and updating this listing to include other manufacturer devices as they evolve.

### **Introduction**

The various types and forms of a Non-Chemical Device (NCD), and descriptions of its operating parameters, are easily located with simple Internet searches. These searches will lead to a variety of companies producing operating equipment. Usually a Wikipedia description of the process or available equipment will also be displayed.

There are many descriptions of presumed or assumed scientific principles, which are offered to explain claimed operations and performance. However, consistent reproducible rules for operation and resultant, verifiable performance results have not been offered or demonstrated, performance is justified mostly by personal endorsements rather than “Factual and Informative Water Treatment Case Histories”; a documentation process outlined by an earlier AWT document.

Below are terms and processes that separate the non-chemical devices. Also included in this document is a reference to a number of non-chemical device manufacturers.

First, a listing of the categories for the processes and functions described.

- Magnetic
- Electromagnetic
- Electrostatic
- Catalytic
- Mechanical
- Mixed Systems

## **Magnetic**

Magnets have been used in one form or another since the 1200s. The properties of magnetic fields have been studied from the early 1800s where fields were demonstrated using fine iron filings and bar magnets. Gauss and Tesla are units that are commonly used to express the strength of a magnet. As an example, a permanent magnet applied around a pipe might exert up to 15,000 gauss (1.5 Tesla). NCD manufacturers will usually not share the strength of their magnets making it difficult to duplicate observed results.

As an example, an average kitchen refrigerator magnet is approximately 5mT or about 50 gauss. An NCD might have magnets anywhere in between a kitchen magnet and a full strength permanent magnet.

The workings of a magnetic NCD are often compared to Nuclear Magnetic Resonance spectroscopy (NMR) or Magnetic Resonance Imaging (MRI). NMR uses electromagnets, which produce 60,000 gauss, or greater (6 Tesla, up to 11.7T), and commercial MRI's operate at 3,000 to 30,000 Gauss (0.3 to 3 Tesla) but have been run experimentally up to 17T. The more powerful systems have cryogenically super cooled magnets.

Claims are made for corrosion control, scale control, and/or microbiological control, depending on the supplier. Magnets may be arranged around the outside of a tube or pipe, or internally, in direct contact with the water to be treated.

Access to many diverse suppliers may be had by searching the Internet with the terms Magnetic Water Treatment.

## **Electromagnetic**

Exactly the same functions and process abilities may be ascribed to an electrically generated magnetic field as to a permanent magnet. However, higher strengths may be generated if desired. Again, we have not found any NCD manufacturers that have published the strength of their fields. However, these devices commonly have a low power, low voltage supply providing either alternating or DC current to one, or more, coils wound around the outside of the pipe through which the water to be treated flows. This precludes the use of high-energy magnetic strengths.

Electronic circuits, which provide intermittent electrical current, are described as "pulse power" or "radio frequency", however these devices are electromagnetic, regardless of specific claims.

Access to many diverse suppliers may be had by searching the Internet with the terms Electromagnetic Water Treatment. The term "pulse power" provides further cites for examination.

## Electrostatic

These units typically consist of a low amperage high voltage DC, or AC, power supply and a capacitor like cell where the water to be treated flows between two insulated plates. These plates are typically charged from 10,000 to 30,000 volts.

This is another configuration of plates and current application, which generates electrical magnetic currents.

Access to many diverse suppliers may be had by searching the Internet with the terms Electrostatic Water Treatment.

Listing all of the websites that discuss these approaches would require more space than this document allows for but two informative references are listed below:



**US Army Corps  
of Engineers**  
Engineer Research and  
Development Center

### Demonstration and Evaluation of Magnetic Descalers

Kent W. Smothers, Charles D. Curtiss, Brian T. Gard, Robert H. Strauss, and Vincent F. Hock, September 2001 ([www.water-services.info/pdf/Hock MagneticDescalers.pdf](http://www.water-services.info/pdf/Hock%20MagneticDescalers.pdf))

The conclusions of this study and the list of literature references contained are particularly informative.

The second reference site: Magnetic water treatment pseudoscience (<http://www.chem1.com/CQ/magscams.html>) provides information on several different magnetic water treatment devices.

## Catalytic

Passage by, or exposure to, the water being treated to catalytic shapes of various materials will, according to the manufacturers, affect the constituents of the water and control / prevent scale, corrosion, deposition, and/or biofouling. Some of these devices appear to be sealed metal containers filled with “powdered metal”, or metal shapes of varied composition which are inserted into either a tank or pipe in the water system being treated. Chemical composition of the catalyst is reported to vary widely, but is claimed by some manufacturers to include transition and precious metals.

In the industrial use of catalysts, intimate contact of the reacting species with the catalyst is imperative. This does not seem to be the case with water treatment NCDs.

Access to many diverse suppliers may be had by searching the Internet with the terms Catalytic Water Treatment. There appears to be no Wikipedia descriptions. However, in this case, besides a few treatment companies being listed, cautioning admonitions are shown such as:

Catalytic water treatment pseudoscience, and  
Drinking Water and Water Treatment Scams

## Mechanical

Devices claimed as being able to mechanically affect the constituents of the water and control / prevent scale, corrosion, deposition, and/or biofouling. The majority of the mechanical devices appear to be based on either a modified centrifugal pump or pumping through a type of eductor or venturi.

Access on the Internet using the terms "Mechanical Water Treatment" yields only a few references and opinions of the properties of mechanical treatments. No Wikipedia description is available. One needs to access the specific mechanical action suggested by the device manufacturer to obtain information.

## Mixed System

This classification was devised within this paper for cases where a non-chemical device is combined with a proven chemical technology such as the use of Iodine for microbiological control or sacrificial anodes for localized corrosion protection. Many times, conductivity blowdown control and side stream filters are also incorporated into such a system. We are using this classification for those systems where the non-chemical device serves a secondary function (i.e. it is NOT the primary part of the package). Please note that many of these devices are being marketed as the primary component of "equipment packages", which may include many proven physical and physical-chemical technologies.

Internet access will require looking at the specific system name, or the non-chemical action expressed by the manufacturer.

Is the device you are contemplating in our list of observed products? Here is an alphabetical list of the devices we have recorded.

<b>Product Name</b>	<b>Principle of Operation</b>	<b>Website</b>
AFT-200	B Electromagnetic	www.saltfreewaterconditioner.net
Aqua-Flo	A Magnetic	None known
AquaMagnets	A Magnetic	<a href="http://aquamagnets.com/">http://aquamagnets.com/</a>
Aquaspace	D Catalytic	www.aquaspace.com/
Bon Aqua	A Magnetic	www.bonaqua.com
Care-Free (Australian)	C Electrostatic	www.carefree.com.au/contact-us.aspx
Clearscale	A Magnetic	<a href="http://www.treatwater.com/">www.treatwater.com/</a>
ClearWave	B Electromagnetic	<a href="http://www.fieldcontrols.com">www.fieldcontrols.com</a>
Colloid-A-Tron (UK)	D Catalytic	<a href="http://www.treatwater.com/">www.treatwater.com/</a>
Commercial Water Instrument	A Magnetic	None known
Cracker (Commercial)	F Mixed Systems	www.salamander-engineering.co.uk
Descal-A-Matic	A Magnetic	descal-a-matic.com
Digital Scale Control System	B Electromagnetic	<a href="http://www.dme.net">www.dme.net</a>
Dolphin	B Electromagnetic	www.clearwater-dolphin.com
ECO Tower System	F Mixed Systems	www.uwatertech.com
Ecology Cell	D Catalytic	www.ecologycell.com

Ejax Water System	D Catalytic	<a href="http://www.ejax.com/">www.ejax.com/</a>
Electropure, Multiple companies, multiple claims	C Electrostatic	<a href="http://www.clearmake.com.au">www.clearmake.com.au</a>
Electrostatic Device component of EnviroTower	F Mixed Systems	<a href="http://www.evandtec.com">www.evandtec.com</a>
Electrostatic Treatment Electrode	C Electrostatic	<a href="http://www.electrochemwatersystems.com">www.electrochemwatersystems.com</a>
Environmentalist/Zero Bleed	A Magnetic	<a href="http://SuperiorWaterConditioners.com">SuperiorWaterConditioners.com</a>
ESF Water Conditioner	A Magnetic	<a href="http://virginpacificwater.com">virginpacificwater.com</a>
Filtersorb SP3	D Catalytic	<a href="http://www.watchwater.com">www.watchwater.com</a>
FlowMark Water Treatment System	B Electromagnetic	<a href="http://www.flowmarkwater.com">www.flowmarkwater.com</a>
Fluidtron	C Electrostatic	<a href="http://www.estatusa.com">www.estatusa.com</a>
FluidTron® system, GMX	C Electrostatic	<a href="http://www.estatusa.com">www.estatusa.com</a>
Guldager Electrolysis System	A Magnetic	<a href="http://gmxinternational.com">gmxinternational.com</a>
H <sub>2</sub> O Green Machine	C Electrostatic	<a href="http://www.elgressy.com">www.elgressy.com</a>
Hard Water System	C Electrostatic	<a href="http://http://aquatron.com/">http://aquatron.com/</a>
Hydrascale HS075	A Magnetic	<a href="http://www.magnetizer.com">www.magnetizer.com</a>
HydroCare	C Electrostatic	<a href="http://www.hydrascale.com">www.hydrascale.com</a>
Hydrolator	C Electrostatic	<a href="http://www.hydrocareusa.com">www.hydrocareusa.com</a>
HydroPath	A Magnetic	<a href="http://www.avoca-tec.com">www.avoca-tec.com</a>
ION Scalebuster	B Electromagnetic	<a href="http://www.hydroPath.com">www.hydroPath.com</a>
IMP, The	C Electrostatic	<a href="http://www.scalebuster.com">www.scalebuster.com</a>
Ion Stick	B Electromagnetic	<a href="http://www.waterimp.co.uk">www.waterimp.co.uk</a>
KDF Fluid Treatment	C Electrostatic	None Known
Limemaster Gold	C Electrostatic	<a href="http://www.kdfft.com">www.kdfft.com</a>
Linear Kinetic Cell	A Magnetic	<a href="http://www.salamander-engineering.co.uk">www.salamander-engineering.co.uk</a>
LKC Water treatment System	B Electromagnetic	ener-tec.com
Magnalawn 2000	B Electromagnetic	<a href="http://www.ener-tec.com">www.ener-tec.com</a>
Magnetizer	A Magnetic	Found in ACS article 1999 Available by search using product name.
Magstream	A Magnetic	<a href="http://www.magnetizer.com">www.magnetizer.com</a>
Mecurs Ring	A Magnetic	<a href="http://www.treatwater.com/">www.treatwater.com/</a>
NEXTEQ	B Electromagnetic	<a href="http://www.mecursonline.com">www.mecursonline.com</a>
OneFlow Anti-Scale System	B Electromagnetic	<a href="http://www.nexteqwatercare.com">www.nexteqwatercare.com</a>
Progressive Descaler	D Catalytic	<a href="http://www.thescalesolution.com">www.thescalesolution.com</a>
Progressive Electronic Water Treater	B Electromagnetic	<a href="http://www.proenv.com">www.proenv.com</a>
Pulse-Pure	C Electrostatic	None Known
QED (Quantum ElectroDynamic)	B Electromagnetic	<a href="http://www.evapco.com">www.evapco.com</a>
SavingEnergyMoney	F Mixed Systems	<a href="http://www.flozone.com">www.flozone.com</a>
SBC	C Electrostatic	<a href="http://www.savingenergymoney.com">www.savingenergymoney.com</a>
Scale -Clear	B Electromagnetic	<a href="http://www.griswoldfiltration.com">www.griswoldfiltration.com</a>
Scale Free System	B Electromagnetic	<a href="http://www.ppe.com">www.ppe.com</a>
ScaleBlaster	C Electrostatic	<a href="http://www.scalefreeintl.com">www.scalefreeintl.com</a>
	B Electromagnetic	<a href="http://www.clearwaterenvirotech.com">www.clearwaterenvirotech.com</a>

Scalemaster	B Electromagnetic	<a href="http://www.scalemaster.co.uk">www.scalemaster.co.uk</a>
Scaleton	D Catalytic	<a href="http://www.treatwater.com/">www.treatwater.com/</a>
Scalewatcher Commercial	B Electromagnetic	www.scalewatcher.com
Scalewatcher Enigma	B Electromagnetic	www.electronicdescaler.com
Sensi (Commercial)	C Electrostatic	www.salamander-engineering.co.uk
Silver Bullet	C Electrostatic	www.silverbulletcorp.com
Soft Wave System	B Electromagnetic	www.softwaveinnovations.com
Sonoxide	E Mechanical	www.ashland.com
Superior Water Conditioners	A Magnetic	www.superiorwaterconditioners.com
SUPRION	C Electrostatic	www.e-sunward.co.jp
The Vulcan	C Electrostatic	www.vulcan-descaler.com
TowerKlean	F Mixed Systems	www.towerklean.com
TowerMate	F Mixed Systems	www.towermate.com
Tri-Tron	B Electromagnetic	www.eh2o.com
UVOX II	Ozone Generation	www.cascadewater.com
VRTX Treatment Chamber	E Mechanical	www.vrtxtech.com
Water Energizers	D Catalytic	www.waterenergizers.com
Water Magnets	A Magnetic	www.ppe.com
Water-Buddy	A Magnetic	<a href="http://www.eamagnetics.com">www.eamagnetics.com</a>
Water Vitalizer Plus	Mechanical	<a href="http://www.vitalizerplus.com">www.vitalizerplus.com</a>
WAVE	B Electromagnetic	www.griswoldwatersystems.com
Zeta Rod	C Electrostatic	www.zetarod.com

If you do not find the device you are involved with in our current listing, please send us an e-mail with the product name and a website, if available, so we may document it and add it to our list.

#### NCDs By Type then Alphabetically

<b>Product Name</b>	<b>Principle of Operation</b>	<b>Website</b>
Aqua-Flo	A Magnetic	None known
AquaMagnets	A Magnetic	<a href="http://aquamagnets.com/">http://aquamagnets.com/</a>
Bon Aqua	A Magnetic	www.bonaqua.com
Clearscale	A Magnetic	<a href="http://www.treatwater.com/">www.treatwater.com/</a>
Commercial Water Instrument	A Magnetic	None known
Descal-A-Matic	A Magnetic	descal-a-matic.com
Environmentalist/Zero Bleed	A Magnetic	SuperiorWaterConditioners.com
ESF Water Conditioner	A Magnetic	virginpacificwater.com
GMX	A Magnetic	gmxinternational.com
Hard Water System	A Magnetic	<a href="http://www.magnetizer.com">www.magnetizer.com</a>
Hydrolator	A Magnetic	<a href="http://www.avoca-tec.com">www.avoca-tec.com</a>
Limemaster Gold	A Magnetic	<a href="http://www.salamander-engineering.co.uk">www.salamander-engineering.co.uk</a>
Magnalawn 2000	A Magnetic	Found in ACS article 1999 Available by search using product name.
Magnetizer	A Magnetic	www.magnetizer.com
Magstream	A Magnetic	<a href="http://www.treatwater.com/">www.treatwater.com/</a>
Superior Water Conditioners	A Magnetic	www.superiorwaterconditioners.com



Water Magnets	A Magnetic	www.ppe.com
Water-Buddy	A Magnetic	<a href="http://www.eamagnetics.com">www.eamagnetics.com</a>
AFT-200	B Electromagnetic	www.saltfreewaterconditioner.net
ClearWave	B Electromagnetic	<a href="http://www.fieldcontrols.com">www.fieldcontrols.com</a>
Digital Scale Control System	B Electromagnetic	<a href="http://www.dme.net">www.dme.net</a>
Dolphin	B Electromagnetic	www.clearwater-dolphin.com
FlowMark Water Treatment System	B Electromagnetic	www.flowmarkwater.com
Hydropath	B Electromagnetic	www.hydropath.com
IMP, The	B Electromagnetic	<a href="http://www.waterimp.co.uk">www.waterimp.co.uk</a>
Linear Kinetic Cell	B Electromagnetic	ener-tec.com
LKC Water treatment System	B Electromagnetic	www.ener-tec.com
Mecurs Ring	B Electromagnetic	www.mecurusonline.com
NEXTEQ	B Electromagnetic	www.nexteqwatercare.com
Progressive Descaler	B Electromagnetic	www.proenv.com
Pulse-Pure	B Electromagnetic	www.evapco.com
SBC	B Electromagnetic	www.griswoldfiltration.com
Scale -Clear	B Electromagnetic	www.ppe.com
ScaleBlaster	B Electromagnetic	<a href="http://www.clearwaterenvirotech.com">www.clearwaterenvirotech.com</a>
Scalemaster	B Electromagnetic	<a href="http://www.scalemaster.co.uk">www.scalemaster.co.uk</a>
Scalewatcher Commercial	B Electromagnetic	www.scalewatcher.com
Scalewatcher Enigma	B Electromagnetic	www.electronicdescaler.com
Soft Wave System	B Electromagnetic	www.softwaveinnovations.com
Tri-Tron	B Electromagnetic	www.eh2o.com
WAVE	B Electromagnetic	www.griswoldwatersystems.com
Care-Free (Australian)	C Electrostatic	www.carefree.com.au/contact-us.aspx
Electropure, Multiple companies, multiple claims	C Electrostatic	<a href="http://www.clearmake.com.au">www.clearmake.com.au</a>
Electrostatic Treatment	C Electrostatic	www.electrochemwatersystems.com
Electrode	C Electrostatic	www.estatusa.com
Fluidtron	C Electrostatic	www.estatusa.com
FluidTron® system,	C Electrostatic	www.estatusa.com
Guldager Electrolysis System	C Electrostatic	www.elgressy.com
H <sub>2</sub> O Green Machine	C Electrostatic	http://aquatron.com/
Hydrascale HS075	C Electrostatic	<a href="http://www.hydrascale.com">www.hydrascale.com</a>
HydroCare	C Electrostatic	www.hydrocareusa.com
ION Scalebuster	C Electrostatic	www.scalebuster.com
Ion Stick	C Electrostatic	None Known
KDF Fluid Treatment	C Electrostatic	<a href="http://www.kdfft.com">www.kdfft.com</a>
Progressive Electronic Water Treater	C Electrostatic	None Known
SavingEnergyMoney	C Electrostatic	www.savingenergymoney.com
Scale Free System	C Electrostatic	<a href="http://www.scalefreeintl.com">www.scalefreeintl.com</a>
Sensi (Commercial)	C Electrostatic	www.salamander-engineering.co.uk
Silver Bullet	C Electrostatic	www.silverbulletcorp.com
SUPRION	C Electrostatic	www.e-sunward.co.jp

The Vulcan	C Electrostatic	www.vulcan-descaler.com
Zeta Rod	C Electrostatic	www.zetarod.com
Aquaspace	D Catalytic	www.aquaspace.com/
Colloid-A-Tron (UK)	D Catalytic	<a href="http://www.treatwater.com/">www.treatwater.com/</a>
Ecology Cell	D Catalytic	www.ecologycell.com
Ejax Water System	D Catalytic	www.ejax.com/
Filtersorb SP3	D Catalytic	www.watchwater.com
OneFlow Anti-Scale System	D Catalytic	www.thescalesolution.com
Scaletron	D Catalytic	<a href="http://www.treatwater.com/">www.treatwater.com/</a>
Water Energizers	D Catalytic	www.waterenergizers.com
Sonoxide	E Mechanical	www.ashland.com
VRTX Treatment Chamber	E Mechanical	www.vrtxtech.com
Water Vitalizer Plus	E Mechanical	<a href="http://www.vitalizerplus.com">www.vitalizerplus.com</a>
Cracker (Commercial)	F Mixed Systems	www.salamander-engineering.co.uk
ECO Tower System	F Mixed Systems	www.uwatertech.com
Electrostatic Device component of EnviroTower	F Mixed Systems	www.evandtec.com
QED (Quantum ElectroDynamic)	F Mixed Systems	www.flozone.com
TowerKlean	F Mixed Systems	www.towerklean.com
TowerMate	F Mixed Systems	<a href="http://www.towermate.com">www.towermate.com</a>
UVOX II	Ozone Generation	www.cascadewater.com

**Products Listed In Literature Sources For Which Internet Searches Have Shown No Response**

<b>Product Name</b>	<b>Principle of Operation</b>
All-State Spacemaster	Electronic Softener
Aqua Cells	Micromagnetic
Aqua Electric Scale Control	Electrolytic
Aqua King	Sequestering Agent
Aqua Magnetics	Magnetic
Aqua-Aid	Magnetic
Aqua-Tec	Electrostatic
Aqua-TRON	Electronic
Aquatronics	Electrostatic
Ashbrook Water Stabilizer	Pressure Drop-Filter
Beco-Cell	Electrolytic
Butler Electrostatic	Electrolytic
CEPI	Magnetic
Corroscale Tool	Special Alloy Fitting-Pressure Drop
Crustex	Ultrasonic
Dehydrosal Systems	Electrolytic
Electr-A-Sonic	Electrostatic-Ultrasonic
Electronic WaterTreater	Electron Generator
ElectrostaticWaterTreater	Electrostatic
Ener Tec	Linear Kinetic Cel

ESSA Static Water Probe	Electrostatic
EVIS	Catalytic
EWC5000	Electromagnetic
Filter-AllElectronic	Catalytic
Fluid Stabilizer	Special Alloy-Filter
Fluid-Tec	Magnetic
Free-Flo	Catalytic
Hako	Magnetic
Hydro-Clean	Electrostatic-Magnetic
Hydrodynamics	Magnetic
Hydro-Tron	Electrolytic
Ingersoll-Rand	Electrostatic
Kemtune	Magnetic
Magnaflo	Magnetic
Magnetizer	Magnetic
MidlandPacific	Electronic
Natural Energizer	Pyramid Power
Nokem	ElectromotiveForce
Paracat Water Stabilizer	Catalytic
Petro-Mag	Magnetic
Phillips	Electrostatic
Power Management	Electrostatic
Pow-R-Cell	Flux Force Field
SALMO Scale Inhibitor	Electronic
Scale Control Systems	Electrostatic
Salegon	Electronic
Sentry EMTU	Electromagnetic
SFS Scale Free Systems	Electrolytic Grounding
Softron	Magnetic
Softy	Electronic Softener
SOLA	Catalytic
Sonic	Magnetic
Stain-Out	Magnetic
Sulletron	Electronic
Tarnpure	Silver Ion Release
TPT Chelator	Softener
Transfer Rods	Electrostatic Grounding
Ultrastat	Electrostatic
Wateco	Electrostatic
Water Stabilizer	Catalytic
Worthington	Electrostatic

## Non-Chemical Devices - Supplier Listing

### Magnetic

<b>Product name</b>	<b>Aqua-Flo</b>
Manufacturer	Aqua-Flo Inc. 6244Franklin Ave. Baltimore, MD 21206-4902
Phone/FAX	410-485-7600/410-488-2030
Website	None Known
Equipment Package	Packaged with other water preparation devices such as RO.
Claims	Cleans scaled systems and changes scale crystallization habit for calcium carbonate.

<b>Product name</b>	<b>AquaMagnets</b>
Manufacturer	Magnetic Water Conditioning 1544 E 260 North Spanish Fork, UT 84660
Phone/FAX	(801) 210-2563
Website	<a href="http://aquamagnets.com/">http://aquamagnets.com/</a>
Equipment Package	¾” Unit, (\$177)- 3” Unit (\$1,095) (1/2013)
Claims	Scale control

<b>Product name</b>	<b>Bon Aqua</b>
Manufacturer	Bon Aqua International, Inc. PO Box 19047 Greensboro, NC 27419-9047
Phone/FAX	336-662-0020      F 336-662-0385
Website	<a href="http://www.bonaqua.com">www.bonaqua.com</a>
Equipment Package	Ring installed around pipe which contains several permanent magnets.
Claims	Eliminates scale buildup, non-biological corrosion problems, and controls new scale and algae growth. Cooling towers appear to be full flow installations while boilers are on the makeup or feedwater line.

<b>Product name</b>	<b>Clearscale</b>
Manufacturer	Fluid Dynamics White Place, River Road, Taplow, BUCKS SL6 0BG Ireland
Phone/FAX	T: +44 (0) 1628 634073 F: +44 (0) 1628 670981
Website	<a href="http://www.treatwater.com">www.treatwater.com</a>
Equipment Package	Clearscale is a specially design array of raw earth magnets encased in a copper tube
Claims	Clearscale units prevent and often remove existing scale in domestic, industrial and institutional installations.

<b>Product name</b>	<b>Commercial Water Instrument</b>
Manufacturer	QMS Technologies, Inc 12496 York Road, Unit B North Royalton, OH 44133
Phone/FAX	440-877-9840      F 440-877-9834
Equipment Package	Permanent magnet assembly typically sold with a hydrocyclone and copper-silver ionization unit for side stream cooling tower use. Pipe section with permanent ceramic magnets installed in makeup water line used for boiler treatment.
Claims	In cooling towers, claims control of scale, corrosion, and biological problems. Prevents hard water scale in boilers.

<b>Product name</b>	<b>Descal-A-Matic</b>
Manufacturer	Descal-A-Matic 1516 Springmedow Blvd. Norfolk, VA 23518
Phone/FAX	757-858-5593/757-853-3321
Website	<a href="http://descal-a-matic.com">descal-a-matic.com</a>
Equipment Package	Flow through pipe sections containing magnets
Claims	Will remove existing scale and prevent future scaling. Makes tower effluent suitable for irrigation purposes on site.

<b>Product Name</b>	<b>Environmentalist/Zero Bleed (SF Models Boilers)</b>
Manufacturer	Superior Water Conditioners Div of Magnatech Corporation 2015 South Calhoun Street PO Box 13343 Fort Wayne, IN 46868-3343
Phone/FAX	800-692-1123 260-456-3596/260-456-3598
Website	<a href="http://SuperiorWaterConditioners.com">SuperiorWaterConditioners.com</a>
Equipment Package	Environmentalist/Zero Bleed, Environmentalist
Claims	Controls the formation of scale and corrosion deposits. Discharge water is pollution free.

<b>Product Name</b>	<b>ESF Water Conditioner (Was EnviroScaleFree)</b>
Manufacturer	(Dual Names) Dime WATER Virgin Pacific Water Inc. 2575 Fortune Way Suite J Vista, CA 92081
Phone/FAX	Dime Water 760-734-5787 Virgin Water 414-241-8808/760-734-5798
Website	<a href="http://virginpacificwater.com">virginpacificwater.com</a>
Equipment Package	Flow through pipe sections with catalytic/magnetic prevention device. Dime has brass colored end fittings, Virgin has black colored end fittings.
Claims	Hardness is rendered harmless. Uses no chemical or salt.

<b>Product Name</b>	<b>GMX</b>
Manufacturer	GMX International 13771 Roswell Ave., Suite A Chino, CA 91710
Phone/FAX	909-627-5700/909-627-4411 800-373-4469
Website	<a href="http://gmxinternational.com">gmxinternational.com</a>
Equipment Package	Strap-on magnet packages, not for iron pipe. Needs non magnetic pipe for installation.
Claims	"Ideally, magnetic treatment requires a laminar (Smooth) flow of the fluid through the magnetic field for maximum effectiveness." Disrupts "captive" hardness packages and increases carrying power of water. Dissolves existing scales. Improves hydrocarbon combustion.

<b>Product Name</b>	<b>Hard Water System</b>
Manufacturer	Magnetizer Industrial Technologies Inc. 6191 Kellers Rd. Pipersville, PA 18947
Phone/FAX	215-766-9150 F 215-766-9156
Website	www.magnetizer.net
Equipment Package	Clamp on magnets
Claims	Prevents scale and corrosion Eliminates pre-existing scale and corrosion Reduces algae and biocide additives

<b>Product Name</b>	<b>Hydrolator</b>
Manufacturer	Avoca Tec 12150 South Piney Point Road Bishopville, MD 21813
Phone/FAX	410-352-5524
Website	<a href="http://www.avoca-tec.com">www.avoca-tec.com</a>
Equipment Package	Permanent ceramic magnet device for scale and corrosion control. Chlorine and bromine recommended for biological control as needed.
Claims	Controls scale and corrosion.

<b>Product Name</b>	<b>Limemaster Gold</b>
Manufacturer	Salamander (Engineering) Ltd The Heath Business & Technical Park Runcorn Cheshire WA7 4QX
Phone/FAX	+44 (0)1928 583 280 F +44 (0)1928 562 890
Website	www.salamander-engineering.co.uk
Equipment Package	The Limemaster Gold works by passing a flow of fresh water through a high quality pressure tested polyethylene plastic body in which a powerful ceramic magnet is mounted.
Claims	A small electrical charge is placed on the water particles, which alters the behaviour of hard water-soluble salts, which are in the solution.

<b>Product Name</b>	<b>Magnalawn 2000</b>
Manufacturer	Unknown
Phone/FAX	
Website	Found in ACS article 1999 Available by search using product name.
Equipment Package	
Claims	Improves irrigation ability of water

<b>Product Name</b>	<b>Magnetizer</b>
Manufacturer	Magnetizer 6191 Kellers Church Road Pipersville, PA 18947
Phone/FAX	215-766-9150 F 215-766-9156
Website	<a href="http://www.magnetizer.com">www.magnetizer.com</a>
Equipment Package	Ring installed around pipe which contains several permanent magnets. Full flow installation on most applications.
Claims	Elimination and prevention of scale, reduces biocide use,

<b>Product Name</b>	<b>Magstream</b>
Manufacturer	Fluid Dynamics White Place, River Road, Taplow, BUCKS SL6 0BG Ireland
Phone/FAX	T: +44 (0) 1628 634073 F: +44 (0) 1628 670981
Website	<a href="http://www.treatwater.com">www.treatwater.com</a>
Equipment Package	Magstream is a specially designed array of rare earth magnets encased in a stainless steel sleeve.
Claims	Magstream not only prevents the build up of scale, it will also gradually remove existing scale in many cases.



<b>Product Name</b>	<b>Superior Water Conditioners (SF Models Boilers/Heat Exchangers)</b>
Manufacturer	Superior Water Conditioners 2015 S. Calhoun Street Fort Wayne, IN 46868-3343
Phone/FAX	800 692-1123 F 260-456-3598
Website	www.superiorwaterconditioners.com
Equipment Package	Multiple models, SF for Cooling Water.
Claims	“Superiorzed <sup>®</sup> water controls the formation of scale and corrosion deposits without the use of hazardous and costly chemicals.”

<b>Product Name</b>	<b>Water Magnets</b>
Manufacturer	Plastics Process Equipment, Inc Las Vegas, Odessa Florida
Phone/FAX	800 256 8877 (LV), 800 282 6783 (Odessa)
Website	www.ppe.com
Equipment Package	Steel Clamp on housing
Claims	Stops deposition in hot water heaters. Quotes South African publication.

<b>Product Name</b>	<b>Water-Buddy</b>
Manufacturer	Enerflux-Armtek Magnetics, Inc. (EAM) 6 Platinum Court Medford, NY 11763
Phone/FAX	800 227-6835 F 215-504-1001
Website	<a href="http://www.eamagnetics.com">www.eamagnetics.com</a> <a href="http://www.water-buddy.com">www.water-buddy.com</a>
Equipment Package	Strap on magnets for any size piping.
Claims	“Shown to prevent scale and scale induced corrosion. Water-Buddy prevents the random bonding of these molecules (calcium and magnesium) and keeps them in solution.”

# Electromagnetic

<b>Product Name</b>	<b>AFT-200</b>
Manufacturer	Earth Friendly Solutions, LLC. 96 Silbani Lane Florissant, CO 80816.
Phone/FAX	888-603-6301 F
Website	<a href="http://www.saltfreewaterconditioner.net">www.saltfreewaterconditioner.net</a>
Equipment Package	Electromagnetic device that appears to be a power supply with two coils of wire wrapped around the water pipe. Typically installed as a full flow unit.
Claims	Controls scale.

<b>Product Name</b>	<b>ClearWave</b>
Manufacturer	Field Controls (Distributor) 2630 Airport Road Kinston, NC 28504
Phone/FAX	t: 252.522.3031 f: 252.522.0214
Website	<a href="http://www.fieldcontrols.com">www.fieldcontrols.com</a>
Equipment Package	The ClearWave attacks hard water particles with electro-magnetic waves, treating the entire water system in your home and helping prevent and reduce hard water problems.
Claims	The ClearWave neutralizes these particles. Once treated by the ClearWave Water Conditioner, calcium and magnesium particles remain in suspension, flowing freely through the system and down the drain.

<b>Product Name</b>	<b>Digital Scale Control System</b>
Manufacturer	DME Molding Supplies
Phone/FAX	Northern Supply 800-365-6565, Nickerson Machinery 800-821-9534, OHS (Ontario 888-809-7050)
Website	<a href="http://www.dme.net">www.dme.net</a>
Equipment Package	DSc100 – DSC1200 (1” to 12”) Coil wrapped around a pipe, controlled by a “Digital Scale Control System box.
Claims	The DME Molding Supplies digital scale control system has a unique computer program that creates a complex group of frequencies that are amplified and driven into a coil that surrounds the pipe. Minerals in the water are continually bombarded with complex high frequencies which fractures them to a microscopic size. This transforms the water into an improved solvent (12%–14% reduced surface tension) that converts existing lime scale into a soft sludge. This is removed at the lowest point of the system.

<b>Product Name</b>	<b>Dolphin</b>
Manufacturer	Clearwater Systems, LLC 145 Dennison Road, PO Box 463 Essex, CT 06426
Phone/FAX	860-767-0850 F 860-767-8972
Website	<a href="http://www.clearwater-dolphin.com">www.clearwater-dolphin.com</a>
Equipment Package	Wire coil around pipe, low output power supply. Typically installed on full flow in cooling towers, feedwater line on boilers.
Claims	Controls scale, corrosion, and biological growth.

<b>Product Name</b>	<b>FlowMark Water Treatment System</b>
Manufacturer	FlowMark Water Treatment 1401 Mollie Road Daytona Beach, Florida 32114
Phone/FAX	386-453-5091
WEB Site	<a href="http://www.flowmarkwater.com">www.flowmarkwater.com</a>
Equipment Package	Power supply and coil unit.
Claims	Reduces salt use in cation exchanger water softeners. Unit claims to “reduces salt requirement 30 to 50%” for regeneration of water softeners. Claimed mechanism is that the “powerful energy pulses –alters the normal behavior of hard water minerals” – causes some of the calcium to precipitate on to suspended solids and pass harmlessly through the softener”. Also sold for use on cooling towers to prevent scale and corrosion, control biological growth.

<b>Product Name</b>	<b>HydroPath</b>
Manufacturer	HydroPath Holdings Limited Unit F, Acorn park, Redfield Road Nottingham, NG7 2 TR, UK
Phone/FAX	44 0 1159 869 966 F 44 0 1159 869 944
Website	<a href="http://www.hydroPath.com">www.hydroPath.com</a>
Equipment Package	Electromagnetic transducer clamped to outside of pipe with radio frequency power supply. Typically installed on main piping of cooling towers and feedwater piping of boilers.
Claims	Controls scale formation and removes old scale. Kills algae and bacteria. .

<b>Product Name</b>	<b>The IMP (ELF, Super Imp, Heavy Duty IMP)</b>
Manufacturer	Water Improvement Limited Marcage House 38A Warren Rise Camberley Surrey GU16 8SN UK
Phone/FAX	01252 511882
Website	www.waterimp.co.uk
Equipment Package	The Water Imps are Electronic Water Conditioners which use very powerful low frequency signals which effectively treat all conditions of water and flow rates.
Claims	create a strong magnetic field, which has the effect of altering the formation of calcium carbonate crystals (limescale), so that they remain in suspension in small particles and do not form hard crystalline deposits inside pipes, boilers and domestic appliances.

<b>Product Name</b>	<b>Linear Kinetic Cell</b>
Manufacturer	Ener-Tec, Inc. PO Box 85 Union City, MI 49094
Phone/FAX	517-741-5015/517-741-3474
Website	<a href="http://ener-tec.com">ener-tec.com</a>
Equipment Package	Wire coil around pipe, low output power supply. Full flow installation on cooling towers, boiler installations are on feedwater line.
Claims	Prevents formation of scale and removes existing scale deposits.

<b>Product Name</b>	<b>LKC Water treatment System</b>
Manufacturer	Ener Tec, Inc. P.O. Box 85 Union City, MI 49094
Phone/FAX	517 741-5015 F 517 741-3474
Website	www.ener-tec.com
Equipment Package	Electric coils around a titanium tuber.
Claims	If two molecules of calcium (for example) are polarized by an LKC then the south pole of one will attach itself to the north pole of the other. With a long chain of molecules "holding hands" they are unable to attach themselves to the walls of your pipe (creating scale). Claim of biomass control is NOT substantiated by the companies own research report!

<b>Product Name</b>	<b>Mecurs Ring</b>
Manufacturer	Mecurs (Germany)
Phone/FAX	US 562 427 2587 (Long Beach, CA)
Website	www.mecursonline.com
Equipment Package	Wrap around ring straps on pipe and emits three different kinds of "Oscillations"
Claims	One Oscillation fights rust, One fights calcium carbonate, and one fights microbiological fouling.

<b>Product Name</b>	<b>NEXTEQ</b>
Manufacturer	Nexteq Limited 9323 Fairmount Road Novelty, OH 44072
Phone/FAX	440-338-3175/440-338-3174
Website	www.nexteqwatercare.com
Equipment Package	Electromagnetic coil device used to control scale, silver-copper-zinc ionization for biological control, sidestream filtration for deposition control. Unit skid mounted with pump.
Claims	Prevents scale formation via calcium ion acceleration “forcing calcium carbonate ions to precipitate as a non scale forming mineral crystal (aragonite).” Centrifugal filtration removes suspended solids. Copper and silver ions control biological growth. Corrosion control by high developed alkalinity and presence of zinc ions. Recommended for use on cooling towers, evaporative condensers, & chillers.

<b>Product Name</b>	<b>Progressive Descaler</b>
Manufacturer	Progressive Environmental, LLC P.O. Box 348 Chardon, OH 44024
Phone/FAX	800-491-5815
Website	www.proenv.com
Equipment Package	Wire coil wound around pipe with electrical control box.
Claims	“Prevent the formation of scale and Remove existing scale.” “The ionic field built up in a physical water treatment system focuses immediately and specifically on calcium and magnesium crystals which comprise the greatest portion of the impurities in most process water. These crystals are altered in shape by the ionic charge applied increasing their solubility and remain suspended in the water flow instead of forming deposits on heat transfer surfaces.” Note that this firm also sells filters, water softeners, hydrocyclones, sidestream filters, and claims a “complete line of chemical formulations for boiler water, cooling water, potable water, process waters, and wastewater treatment”

<b>Product Name</b>	<b>Pulse-Pure</b>
Manufacturer	EVAPCO PO Box 1300 Westminster, MD 21158
Phone/FAX	410-756-2600 F 410-756-6450
Website	<a href="http://www.evapco.com">www.evapco.com</a>
Equipment Package	Wire coil around pipe with low output power supply, sold with service package and blowdown control, often as part of a new cooling tower installation. Full flow installations are typical.
Claims	Device controls scale, corrosion, and biological growth.

<b>Product Name</b>	<b>SBC</b>
Manufacturer	Griswold Filtration 2801 Barranca Parkway Irvine, CA 92606
Phone/FAX	949-559-0671 F 949-559-1431
Website	<a href="http://www.griswoldfiltration.com">www.griswoldfiltration.com</a>
Equipment Package	Wire coil around pipe with low output power supply, sold as a package with hydrocyclone.
Claims	Physical water treatment device that controls scale, bacteria, and corrosion via a modulated signal applied to the water via the coil.

<b>Product Name</b>	<b>Scale -Clear</b>
Manufacturer	Plastics Process Equipment, Inc Las Vegas, Odessa Florida
Phone/FAX	800 256 8877 (LV), 800 282 6783 (Odessa)
Website	www.ppe.com
Equipment Package	Coil wrapped around a pipe connected to a "Digital Scale Control System"
Claims	Stops deposition scale, and dissolves existing scale deposits.

<b>Product Name</b>	<b>ScaleBlaster</b>
Manufacturer	Clearwater Enviro Technologies, Inc. 8767 115th Avenue North Largo, FL 33773 USA
Phone/FAX	1-800-756-7946 727-562-5186 727-562-5187 (fax)
Website	<a href="http://www.clearwaterenvirotech.com">www.clearwaterenvirotech.com</a> <a href="http://www.scaleblaster.com">www.scaleblaster.com</a>
Equipment Package	Induction coil and controller.
Claims	This innovative product produces an oscillating electronic field using a unique and complex modulating frequency wave form that changes the physical shape, size and charge of the calcium molecules and causes them to lose their adhesive properties

<b>Product Name</b>	<b>Scalemaster, Electrolytic Inhibitor, Magnetic Platinum, Electrolytic Platinum</b>
Manufacturer	D.A.W Enterprises LTD Emerald Way, Stone Business Park, Stone, Staffordshire, ST15 OSR, United Kingdom
Phone/FAX	017785 811636
Website	<a href="http://www.scalemaster.co.uk">www.scalemaster.co.uk</a>
Equipment Package	Perminate and electrochemical
Claims	Home applications, and Electrolytic shower system.

<b>Product Name</b>	<b>Scalewatcher Commercial</b>
Manufacturer	Scalewatcher North America, Inc. 345 Lincoln Street Oxford, PA 19363
Phone/FAX	610-932-6888      F 610-932-7559
Website	<a href="http://www.scalewatcher.com">www.scalewatcher.com</a>
Equipment Package	Wire to wrap around incoming water supply. Initiation controller.
Claims	Complex electromagnetic waves cause dissolved calcium ions to form carbonate complex, which will not precipitate until out of the system. This allows water to act as if softened and thereby dissolve any existing scale deposits. "This is something chemically softened waters can not do."

<b>Product Name</b>	<b>Scalewatcher Enigma</b>
Manufacturer	Environmental Treatment Concepts, LTD. 7 Funtley Court, Funtley Hill, Fareham, Hampshire. PO16 7UY
Phone/FAX	440 1329 836960 F 440 1329 835406
Website	<a href="http://www.electronicdescaler.com">www.electronicdescaler.com</a>
Equipment Package	Wire coil around outside of pipe, low output power supply. Cooling tower installations typically on full flow, boilers on feedwater pipe.
Claims	Prevents scale and descales existing systems.

<b>Product Name</b>	<b>Soft Wave System</b>
Manufacturer	Soft Wave Innovations, Inc. 7335 West Morrow Drive Glendale, AZ 85308-5848
Phone/FAX	623-444-9547
WEB Site	<a href="http://www.softwaveinnovations.com">www.softwaveinnovations.com</a>
Equipment Package	Packaged electromagnets with DC power supply, sidestream filter supplied as an option.
Claims	Prevents scale formation via “Multi-vibrational electromagnetic fields” which claims “by treating the water, the calcium is held in suspension which prevents the calcium from bonding in pipes, water heaters, and on other surfaces.” Their patent application claims use in “eliminating calcium buildup in pipes; reducing soap use in laundry, reducing salt usage in water softeners, reducing chlorine use in pools; inhibiting algae growth; increasing water clarity; restricting or inhibiting nitrates, tannins, calcium salts, and other minerals; treating pain; treating inflammation; enhancing after surgery healing; and improving circulation in treated areas of animals and humans.”

<b>Product Name</b>	<b>Tri-Tron</b>
Manufacturer	eH <sub>2</sub> O, LLC 381 North Reese Street South Lyon, MI 48178
Phone/FAX	248-437-4232 F 248-437-1241
Website	<a href="http://www.eh2o.com">www.eh2o.com</a>
Equipment Package	Wire coil device on water line with low output power supply. Often supplied with a UV lamp assembly for additional biological control, filtration, and conductivity blowdown control. Installed on cooling water sidestream.
Claims	Controls scale, corrosion, and biological problems.



<b>Product Name</b>	<b>WAVE</b>
Manufacturer	Griswold Water Systems 1597 Industrial Drive New Smyrna Beach, FL 32168
Phone/FAX	386-663-3370      F 386-663-3371
Website	<a href="http://www.griswoldwatersystems.com">www.griswoldwatersystems.com</a>
Equipment Package	Four wire coils in device located on makeup water line. Power supply provides both AC and DC signals and pulses to water. Currently sold as stand alone water treatment by various distributors and at least one CT manufacturer.
Claims	Controls scale, corrosion, and biological problems.

# Electrostatic

<b>Product Name</b>	<b>Care-Free (Australian)</b>
Manufacturer	Care-Free 3/73 Dobney Ave (PO Box 681) Wagga Wagga, NSW 2650 ABN 50 614 975 048
Phone/FAX	+61 2 02 6925 2304; 02 6925 1835 Fax 02 6925 5078
Website	<a href="http://www.carefree.com.au/contact-us.aspx">http://www.carefree.com.au/contact-us.aspx</a>
Equipment Package	Pipe length + Ground Battery
Claims	When installed in a cooling tower system Care-Free virtually eliminates the biofilm in which bacteria grows and multiplies. Therefore, minimal regular maintenance is required to keep the tower in a 'clean' condition.

<b>Product Name</b>	<b>Electropure, Multiple companies, multiple claims</b>
Manufacturer	1. Ground Effects Environmental Services (Canada) 2. Clearmake (Australia)
Phone/FAX	1. 306 352 1400 F 306 352 1412 2. 61 7 5455 6822 F 61 7 5455 6833
Website	1. <a href="mailto:gee@groundeffects.org">gee@groundeffects.org</a> 2. <a href="http://www.clearmake.com.au">www.clearmake.com.au</a>
Equipment Package	1. Remediation using direct current in the environment. 2. Flocculation using metals generated from electrodes.
Claims	Little or no chemical use.

<b>Product Name</b>	<b>Electrostatic Treatment Electrode</b>
Manufacturer	ELECTROchem Water Systems Division Chemfree Water Systems, Inc. 3320 Nazareth Road Easton, PA 18045
Phone/FAX	800-949-3445 F 610-438-4472
Website	<a href="http://www.electrochemwatersystems.com">www.electrochemwatersystems.com</a>
Equipment Package	Insulated electrode assembly that is inserted into the water system to be treated. Power applied is 10,000 to 20,000 vdc. Power consumption is listed at 7 watts. Typically installed in full flow locations.
Claims	Controls scale, charge particles and keep them in suspension , water surface tension is reduced and thermo transfer is increased, also disrupts laminar boundary layers, existing scale formed in boundary layers is eventually removed.

<b>Product Name</b>	<b>Fluidtron</b>
Manufacturer	Electrostatic Technologies, Inc./Fluid Treatment Solutions, Inc./ Fluid Treatment Services, Inc. 402 Osage Avenue Kansas City, KS 66105
Phone/FAX	913-342-0110 F 913-342-0999
Website	<a href="http://www.estatusa.com">www.estatusa.com</a>
Equipment Package	Either insulated tubular electrodes or insulated flat plate assemblies, both installed in cooling tower basins. Low output power supply. Installed inline or in cooling tower basins.
Claims	Controls scale and biological problems.

<b>Product Name</b>	<b>Guldager Electrolysis System</b>
Mode of operation	Aluminum electrodes releasing aluminum into the water stream.
Manufacturer	Elgressy Engineering Services Ltd. CTG House, En Vered Tel Mond, 40696, Israel
Phone/FAX	+972.9.862.3112
Website	<a href="http://www.elgressy.com">www.elgressy.com</a>
Equipment Package	Electrolytic activation of aluminum electrodes
Claims	Prevents scaling, reduces corrosion and reduces oxygen levels in the water.

<b>Product Name</b>	<b>H<sub>2</sub>O Green Machine</b>
Manufacturer	Advanced Aquatronics International Corp. 1775 Blount Road #407 Pompano Beach, FL. 33069
Phone/FAX	800) 737-5164 (954) 984-9849
Website	<a href="http://aquatron.com/">http://aquatron.com/</a>
Equipment Package	Energy Chamber and controller
Claims	Makes water wetter.

<b>Product Name</b>	<b>Hydrascale HS075 – 400 (.75”-4”)</b>
Manufacturer	Hydrascale Corp. P.O. Box 5 Katy, Texas 77492
Phone/FAX	979-885-0340 F 979-885-0560
Website	<a href="http://www.hydrascale.com">www.hydrascale.com</a>
Equipment Package	HYDRASCALE® electrolytically changes the aggressive state of hard water.
Claims	As water, with dissolved hardness minerals, passes over the HYDRASCALE® coil, a small electric charge is given off. The dissolved minerals, when electrically charged, change their ionic state. Negative charged ions become positive charged ions. The altered state of all positive charged particles prevents the scale damaging minerals from sticking together and adhering to plastic and metal surfaces.

<b>Product Name</b>	<b>HydroCare</b>
Manufacturer	HQ HomeTek – HydroCare distributor 3670-3 West Oceanside Road Oceanside, NY 11572
Phone/FAX	866-486-4339 F
Website	<a href="http://www.hydrocareusa.com">www.hydrocareusa.com</a>
Equipment Package	Electrical device that claims to transmit radio frequency signal through water systems. Typically installed as a full flow unit on system piping.
Claims	Transmitted signal breaks up limescale. “Also reduces algae and bacteria in the water.”

<b>Product Name</b>	<b>ION Scalebuster</b> Note: Believed to be the same as the Electrostatic Device sold by evantec (Formerly EnviroTower)
Manufacturer	ION Enterprises, LTD Arena C 15, 9 Nimrod Way Ferndown, Dourest BH21 7SH United Kingdom
Phone/FAX	
Website	<a href="http://www.scalebuster.com">www.scalebuster.com</a>
Equipment Package	Non powered static rod device with zinc electrode. Sold as stand alone scale control device and part of a package by such firms as EnviroTower. Typically installed as a sidestream unit.
Claims	Controls scale.

<b>Product Name</b>	<b>Ion Stick</b>
Manufacturer	York Energy Conservation 55 West Beaver Creek Road, Unit 2 Richmond Hill, Ontario, Canada L4B1K5
Phone/FAX	905-764-3232 F 905-764-8325
Website	
Equipment Package	Low output power supply with insulated rod assembly for insertion into water. Rod installed in cooling tower basin or boiler feedwater line.
Claims	Helps reduce water side problems.

<b>Product Name</b>	<b>KDF Fluid Treatment</b>
Mode of operation	Redox couple
Manufacturer	KDF Fluid Treatment, Inc. 1500 KDF Drive Three Rivers, MI 49093-9287
Phone/FAX	800 437-2745 F 269-273-4400
Website	<a href="http://www.kdfft.com">www.kdfft.com</a>
Equipment Package	Filter medias
Claims	Removes or reduces chlorine, iron, hydrogen sulfide, heavy metals, microorganisms, scale and lowers total costs.

<b>Product Name</b>	<b>Progressive Electronic Water Treater</b>
Manufacturer	Progressive Equipment Corporation 413 East 9 th Street Erie, PA 16503
Phone/FAX	814-452-4363 F 814-459-3094
Website	
Equipment Package	High voltage power supply with insulated electrode assembly, often sold with hydrocyclone, side stream bag filters, and blowdown controller. Cooling tower installations are full flow, boiler installations are on feedwater line.
Claims	Prevents new scale and removes old scale.

<b>Product Name</b>	<b>SavingEnergyMoney</b>
Manufacturer	Dotson Solutions, LLC 986 Bridgewater Drive Prescott, AZ 86301 Note: Believed to be manufactured by Electrostatic Technologies, Inc./Fluid Treatment Solutions, Inc./ Fluid Treatment Services, Inc. 402 Osage Avenue Kansas City, KS 66105
Phone/FAX	928-778-1901 F 602-828-0147
Website	<a href="http://www.savingenergymoney.com">www.savingenergymoney.com</a>
Equipment Package	Insulated flat plate assemblies installed in cooling tower basins. Low output (10 watts), high voltage, 30 KV, power supply.
Claims	No scale at pH near 9.0, high pH controls biological problems. Corrosion of steel < 3 or 5 mil/yr and copper < 1 or 2 mil/yr dependent upon sales literature checked.

<b>Product Name</b>	<b>Scale Free System</b>
Manufacturer	Scale Free Systems, Inc. 325 Sun Valley Circle Fenton MO 63026
Phone/FAX	636-349-4990 F 636-349-9469
Website	<a href="http://www.scalefreeintl.com">www.scalefreeintl.com</a>
Equipment Package	Electrical control box combined with copper-silver ionization unit.
Claims	Prevents scale formation via “neutralizes the pipes and equipment to the same polarity as the ions in the water”. Controls corrosion by “eliminates the electrical bridge that starts the corrosion process”. Biological control is obtained by use of a copper-silver ionization unit. Recommended for use on “all heat transfer systems, evaporative condensers, chillers, cooling towers, steam boilers & heat exchangers”.

<b>Product Name</b>	<b>Sensi (Commercial)</b>
Manufacturer	Salamander (Engineering) Ltd The Heath Business & Technical Park Runcorn Cheshire WA7 4QX
Phone/FAX	+44 (0)1928 583 280 F +44 (0)1928 562 890
Website	<a href="http://www.salamander-engineering.co.uk">www.salamander-engineering.co.uk</a>
Equipment Package	The SESI is a non polluting electrolytic physical water conditioning process
Claims	Hard salts are encouraged to cling to each other rather than pipework, heating elements

<b>Product Name</b>	<b>Silver Bullet</b>
Manufacturer	The Silver Bullet Corporation 1869 South Jackson Street Denver, CO 80210
Phone/FAX	303-881-6010
Website	<a href="http://www.silverbulletcorp.com">www.silverbulletcorp.com</a>
Equipment Package	Pipe device with internal electrodes that generates monoatomic oxygen via electrostatic field. Sidestream device on cooling towers and is supplied with a sidestream glass bead filter.
Claims	Clean system with a minimal amount of bacteria without any formation of scale or calcium deposits. Can improve system operation by two cycles under most conditions.

<b>Product Name</b>	<b>SUPRION</b>
Manufacturer	Sunward Co. Ltd. 2-4-9 Iwamoto-cho, Chiyoda-Ku Tokyo, 101-0032, Japan
Phone/FAX	81-3-3865-7391 F 81-3-3865-7392
Website	<a href="http://www.e-sunward.co.jp">www.e-sunward.co.jp</a>
Equipment Package	Pipe device with internal electrodes and liner, self generates electrostatic field by friction between water and liner. No external power. Full flow device on cooling towers.
Claims	Prevents formation of scale.

<b>Product Name</b>	<b>The Vulcan</b>
Manufacturer	Christiani Wassertechnik GmbH Heinrich-Heine-Str 15 52249 Eschweiler, Germany
Phone/FAX	917-300-0494
Website	<a href="http://www.vulcan-descaler.com">www.vulcan-descaler.com</a>
Equipment Package	AC power supply with metal tape coils around piping.
Claims	Prevents scale formation via electrophoresis which modifies crystals into “smoother and rod shaped” so that they cannot form a scale. Removes existing scale, prevents corrosion, and “replaces water softeners”. Recommended for use on cooling tower and boiler makeup to prevent scale formation and remove existing scale.

<b>Product Name</b>	<b>Zeta Rod</b>
Manufacturer	Zeta Corporation 2045 North Forbes Blvd., Suite 101 Tucson, AZ 85745
Phone/FAX	520-903-9904 F 520-903-9910
Website	<a href="http://www.zetarod.com">www.zetarod.com</a> <a href="http://www.zetacorp.com">www.zetacorp.com</a>
Equipment Package	Insulated rod assembly and low output power supply. Rod inserted into tank or piping
Claims	Controls scale, corrosion, and biofouling.



# Catalytic

<b>Product Name</b>	<b>Aquaspace</b>
Manufacturer	Aquaspace® Water Systems 7715 Penn Belt Drive Forestville, Maryland 20747
Phone/FAX	800.319.6776 301.568.0200
Website	<a href="http://www.aquaspace.com/prodfr.htm">http://www.aquaspace.com/prodfr.htm</a>
Equipment Package	Filters
Claims	The Aquaspace compound removes toxins, lead, chlorine, toxic volatile organic compounds such as, chloroform, pesticides and herbicides which may be in your water. Each of these contaminants has been linked to either heart disease, cancer or other health related problems.

<b>Product Name</b>	<b>Colloid-A-Tron</b>
Manufacturer	Fluid Dynamics White Place, River Road, Taplow, BUCKS SL6 0BG Ireland
Phone/FAX	T: +44 (0) 1628 634073 F: +44 (0) 1628 670981
Website	<a href="http://www.treatwater.com">www.treatwater.com</a>
Equipment Package	Colloid-A-Tron consists of a pipe with a special alloy core inserted inside.
Claims	The Colloid-A-Tron operates as a catalyst using the pH rise generated by the alloy to trigger precipitation of calcium carbonate in the bulk of the water forming stable crystals.

<b>Product Name</b>	<b>Ecology Cell</b>
Manufacturer	RSI International 235 Country Trace Court Taylorsville, KY 40071
Phone/FAX	502-231-9839 F 502-231-2331
Website	<a href="http://www.ecologycell.com">www.ecologycell.com</a>
Equipment Package	“Cells”, copper tubes packed with mixed mineral compound, are installed in system tanks and sumps.
Claims	Control scale, corrosion, and bacteria in any water system; cooling towers and boilers. Algae control requires supplemental chlorine feed.

<b>Product Name</b>	<b>Ejax Water System</b>
Manufacturer	Ejax Water System 9911 Larson Ave. Suite A Garden Grove, CA 92844
Phone/FAX	714-530-5700 or 888-438-3529.
Website	<a href="http://www.ejax.com/">http://www.ejax.com/</a>
Equipment Package	Packed Pipe Section. Catalyst replaced monthly.
Claims	Ejax Water Treatment Systems are designed to condition the water so minerals are retained in suspension to inhibit scale build up and corrosion in pipes and appliances. This water conditioning creates Wetter Water.

<b>Product Name</b>	<b>Filtersorb SP3</b>
Manufacturer	Watch Water USA 9171 128 th Avenue Largo, Florida 33773
Phone/FAX	866-961-1366 F 727-392-7261
Website	<a href="http://www.watchwater.com">www.watchwater.com</a>
Equipment Package	Catalytic media used in pressure vessels.
Claims	Prevents scale formation via “Nucleation Assisted Crystallization” which “changes calcium and magnesium minerals into harmless “nano” crystals”, “removes existing scale”, and “replaces water softeners”. Recommended for use on cooling tower and boiler makeup to prevent scale formation and remove existing scale.

<b>Product Name</b>	<b>OneFlow Anti-Scale System</b>
Manufacturer	Watts 815 Chestnut Street North Andover, MA 01845-6089
Phone/FAX	800-659-8400 F
Website	<a href="http://www.watts.com">www.watts.com</a> AND <a href="http://www.thescalesolution.com">www.thescalesolution.com</a>
Equipment Package	Fiberglass pressure tank filled with unidentified media. Units sized on peak flow, maximum hardness of 1300 mg/l CaCO <sub>3</sub> , pH of 6.5 to 8.5.
Claims	Prevents scale by transforming dissolved hardness minerals into harmless, inactive microscopic crystal particles as water travels through the media filled tank. Typical hardness problems, especially build-up of scale in pipes, water heaters, boilers, and on fixtures are no longer a concern. Not a water softener or a chemical additive.

<b>Product Name</b>	<b>Scaleton</b>
Manufacturer	Fluid Dynamics White Place, River Road, Taplow, BUCKS SL6 0BG Ireland
Phone/FAX	T: +44 (0) 1628 634073 F: +44 (0) 1628 670981
Website	<a href="http://www.treatwater.com">www.treatwater.com</a>
Equipment Package	Water is passed in a turbulent state over a very special metal alloy which alters the composition of the water near the alloy surface.
Claims	This action changes the supersaturating ratio of the water and ensures that lime does not form hard lime scale.

<b>Product Name</b>	<b>Water Energizers</b>
Manufacturer	Water Energizers 3008 Middle Road, Suite A Jeffersonville, IN 47130
Phone/FAX	812-288-6900      F 812-288-2142
Website	<a href="http://www.waterenergizers.com">www.waterenergizers.com</a>
Equipment Package	“Cells”, metal tubes packed with some material are installed in system tanks and sumps in both boilers and cooling towers. Typically installed in full flow locations.
Claims	Controls scale, corrosion, and biological growth.

## Mechanical

<b>Product Name</b>	<b>Sonoxide</b>
Manufacturer	Ashland Hercules Water Technologies Hercules Plaza 1313 North Market Street Wilmington, DE 19894-0001
Phone/FAX	302-594-5000 F 302-594-5400
Website	<a href="http://www.ashland.com">www.ashland.com</a>
Equipment Package	Unit has a pump and ultrasonic sound generator chamber with associated electronics. Operates as a sidestream unit with cooling water passing through the sound generator chamber..
Claims	Claims to control microbiological growth and biological fouling, “controlling total bacteria, algae, and biofilm”.

<b>Product Name</b>	<b>VRTX Treatment Chamber</b>
Manufacturer	VRTX Technologies 5850 Corridor Parkway Schertz, TX 78154
Phone/FAX	210-651-7402 F 210-579-6926
Website	<a href="http://www.vrtxttech.com">www.vrtxttech.com</a>
Equipment Package	Unit has a pump where the output is split into two streams and then brought back together in a “chamber”. Typically packed with a blowdown controller, hydrocyclone, corrosion coupon rack, and sidestream filter. Operates as a sidestream unit. Original device developed by Chesterton in 2000 and also sold as the “Moltek Water Stabilizer”.
Claims	Claims to control scale, bacteria, and corrosion.

<b>Product Name</b>	<b>Water Vitalizer Plus</b>
Manufacturer	eWater Health Emporium 1850 N. Greenville Ave., Suite 184 Richardson, TX 75081
Phone/FAX	1-800-964-4303
Website	<a href="http://www.vitalizerplus.com/">www.vitalizerplus.com/</a>
Equipment Package	A simple blender
Claims	The Vitalizer Plus was designed to create an unlimited supply of Hexagonal or Structured Water for every day consumption.

## Mixed Systems

<b>Product Name</b>	<b>Cracker (Commercial)</b>
Manufacturer	Salamander (Engineering) Ltd The Heath Business & Technical Park Runcorn Cheshire WA7 4QX
Phone/FAX	+44 (0)1928 583 280 F +44 (0)1928 562 890
Website	<a href="http://www.salamander-engineering.co.uk">www.salamander-engineering.co.uk</a>
Equipment Package	The Cracker works by combining a natural electrolytic process using a zinc alloy anode and an electronic signal derived from a square wave generator.
Claims	It not only protects a pipe system from the formation of limescale encrustation, but will also help breakdown existing scale formation and will minimise rust deposits (in the case of steel pipes) without the use of chemicals or salt.

<b>Product Name</b>	<b>ECO Tower System</b>
Manufacturer	Universal Water Technologies 2443 Oceancrest Blvd Far Rockaway, NY 11691
Phone/FAX	888-838-4914 F
Website	<a href="http://www.uwatertech.com">www.uwatertech.com</a>
Equipment Package	Electromagnetic device is combined with filtration and copper-silver ionization. Typically installed as a sidestream unit on cooling towers.
Claims	The device controls mineral fouling and corrosion, while the microbiological is controlled by copper-silver ionization.

<b>Product Name</b>	<b>Electrostatic Device component of EnviroTower</b> Note: Device sold as Scalebuster in Europe and Asia)
Manufacturer	evandtec (formerly EnviroTower, Inc.) 355 Adelaide Street West Toronto, Ontario, M5V 1S2, Canada
Phone/FAX	416-977-1105 F 416-913-2176
Website	<a href="http://www.evandtec.com">www.evandtec.com</a>
Equipment Package	Package includes an electrostatic device, hydrocyclone, and addition of zinc and iodine to the cooling water. Sidestream filter system for cooling towers.
Claims	Controls scale, fouling, corrosion, and microbiological problems in cooling towers.

<b>Product Name</b>	<b>QED (Quantum ElectroDynamic)</b>
Manufacturer	Flozone Services, Inc. 30 South Maple Street Adamsville, TN
Phone/FAX	888-463-5696
Website	<a href="http://www.flozone.com">www.flozone.com</a>
Equipment Package	Package includes an electromagnetic device, "QED", an ozone generator, and remote monitoring and control system. Sidestream system for cooling towers.
Claims	Controls scale, fouling, corrosion, and microbiological problems in cooling towers. Allows safe operation at increased cycles.

<b>Product Name</b>	<b>TowerKlean</b>
Manufacturer	TowerKlean 5275 Dixie Highway, Suite C4 Waterford, MI 48329
Phone/FAX	248-666-9200      248-666-9202
WEB Site	<a href="http://www.towerklean.com">www.towerklean.com</a>
Equipment Package	Supplied package has a copper-zinc alloy contact chamber, which is claimed to control scale, corrosion, and biological fouling. Backwashing of the contact chamber is used for suspended solids control. Typically installed as a sidestream unit on cooling towers.
Claims	Controls scale, corrosion, and biological problems.

<b>Product Name</b>	<b>TowerMate</b>
Manufacturer	Water Management Systems, LLC 16051 Tonkawood Center Hopkins, MN 55345.
Phone/FAX	952-933-0886
Website	<a href="http://www.towermate.com">www.towermate.com</a>
Equipment Package	Supplied package includes a copper-silver ionization unit for biological control, a magnetic unit for control of scale and corrosion, and a hydrocyclone. Typically installed as a sidestream unit on cooling towers.
Claims	Controls scale, corrosion, and biological problems.

<b>Product Name</b>	<b>UVOX II</b>
Manufacturer	Cascade Water Services, Inc. 113 Bloomingdale Road Hicksville, NY 11801
Phone/FAX	516-932-3030      516-932-0014
WEB Site	<a href="http://www.cascadewater.com">www.cascadewater.com</a>
Device - Ozone	Per US patent 8,628-670, supplied unit is an ultraviolet (UV) light source which radiates an air stream which is then educted into the water system to be treated. The mixed oxidants (ozone + ?) produced by the UV radiation minimizes scaling and biomass buildup in the treated water system. Copper components are claimed to act as catalytic material in the unit construction. No <b>claims</b> are made for corrosion or biological control in the <b>patent</b> . There is a referenced to aragonite being less adherent than calcite and that exposure to the mixed oxidants favors aragonite formation over calcite. Typically installed as a sidestream unit on cooling towers.
Claims	Controls scale and biofilm buildup problems.