

General introduction to Electronic Impulse Technology anti-scale systems

Hard water is often thought of in an unfavourable light due to the problems of scale and it's associated problems, however hard water is actually very healthy to carbon based lifeforms such as us humans as it contains essential minerals. So the question is how to keep the advantages of hard water without having the disadvantages of caused by scale

To better understand how water becomes “hard” we need to look at the complete water cycle –

We start off with rainfall that due to atmospheric pollution is acidic. Once fallen it is either stored as surface water in lakes, reservoirs and rivers or it is absorbed by the surface strata's and filters down through the different porous rock layers. Since it is acidic in nature as it passes through these rock layers it dissolves the minerals and carries said minerals in it in a liquid state. This mineral enriched water will carry on its journey until it reaches an impermeable rock layer. It will then pool and form an underground lake known as an aquifer.



Previously South Africa used to source most of its water from surface resources, but due to the increased demand, agriculture and industrial run off as well as the pollution of so many of our rivers and reservoirs we are being forced to increase our supply of potable water by utilising underground resources - resulting in the increased instances of hard water.

The Amanzi range of anti-scale systems are all “point of entry” units (i.e. installed where the water enters the property, protecting your whole water system, fixtures and fittings) and employ modulating electronic impulses to modify the crystalline structure of calcium and magnesium ions from a complex “sticky” three dimensional snowflake configuration into a simple cylindrical mono-crystal with positive/negative ends that can only form strings and therefore not cluster together to form encrustations.

This ionic modification operates in water with maximum temperature peaks of up to 95°C and lasts for up to 2 days in cold water, up to 7 days in warm water (over 30°C) and for a linear distance of 2000m of pipe work before the effect starts to degrade. (Note, there is a 20% engineering tolerance built into the products so these figures are conservative)

These systems do not employ magnetism, any additives or chemicals (such as salt in ion exchange systems) and leaves the healthy minerals Calcium and Magnesium in the water. Also it does not “soften” the water, only stops the formation of scale encrustations. This means that as well as being healthier, the water is also not as corrosive as soft water (which is acidic), therefore giving double protection to your appliances and pipework.



This Impulse Technology System has the following advantages

- Stops the initial / further build-up of scale on the pipe work and in appliances
- The carbonic acid produced during the electrophoresis phase dissolves the existing scale in your system
- Produces a protective metal-carbonate layer on the exposed metallic surfaces to reduce corrosion and pitting on metallic piping and fittings.
- It can be utilised on any piping material
- Does not remove beneficial minerals from the water supply nor replace them with undesirable salts or chemicals
- It does not need to be cut into the piping system on installation as the control units are attached to the physical piping and the transfer bands are wrapped outside the piping. As well as being a DIY installation it is also considered a switch on and forget system and is maintenance free. It requires a normal electrical connection (240v) with very low wattage (2.25 – 3.25 watt), - with minor costs to the consumer

The Electronic Impulse Technology works as a three tier system to –

- a) stop new scale encrustations
- b) break down existing encrustations
- c) protect the pipework and fittings.

Electronic Impulse Technology stops scaling in pipes and appliances

Without the Electronic Impulse Technology treatment, scale particles in the water form “sticky” crystals that join together to build solid deposits. The Electronic Impulse Technology modifies the crystallization of the calcium and magnesium using the natural process of electrophoreses. The crystals become smoother and rod shaped (mono-crystal) which can only attach end to end forming string and can no longer form encrustations. The longer rod shaped crystals that are created, the stronger the positive effect of scale prevention. Scale is now washed away in the water flow as a microscopic powder



Electronic Impulse Technology gently sanitizes the piping system

The Electronic Impulse treatment breaks the Calcium hydrogen carbonate into its separate elements (electrophoresis) and in doing so increases the availability of carbonic acid thereby enhancing the natural balance between the scaling process and natural resolving process. The resulting mono crystals can no longer form encrustations so the scaling build-up process is reduced. The natural scale resolving process now needs only to deal with the existing deposits and can effectively combat them. The natural surplus of carbonic acid caused by the electrophoresis effect dissolves the scale from the laid down deposits. Gradually and carefully the deposits in the pipes are dissolved and flushed away. With the scale, the existing rust build-up is converted back into solution and as the encrustations are broken down, the bacteria breeding grounds disappear which greatly reduces and eventually removes that contamination threat.



Protection against rust damage and perforation

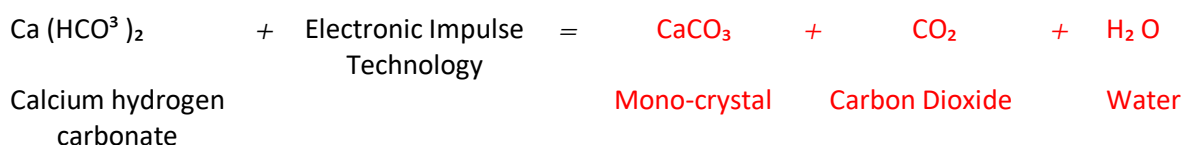
Copper and/or iron oxidation occurs in all metal pipes, fittings and appliances through contact with hard water. These oxides seriously affect the surfaces and often lead to corrosion.

The electrophoresis effect caused by the Electronic Impulse Technology generates a protective metal carbonate layer on the exposed metal surfaces against electrolytic and chemical corrosion.

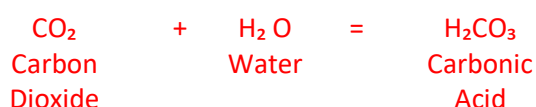


The chemical reaction for the effect of the electronic impulses with a hard (calcium rich) water supply is as follows

Birth of the Mono-crystal



Electrophoresis effect to dissolve existing scale encrustations via the production of carbonic acid



The Electronic Impulse Systems are calibrated to work on pipe sizes from 40mm/1 ½" (or below) with a treated flow of 2000/3000ltr per hour up to 1000mm/40" with an unlimited treatment flow rate and all systems are suitable for all piping materials (iron, copper, stainless steel, plastic, PVC, PE-X, composite) and can treat water with a measured hardness of up to 900ppm/50°dH

Other important factors when looking at anti-scale systems

- Flow rate – as scale builds up in the piping system it reduces the bore of the pipework, allowing less water to physically pass through it and reducing the water available at the end draw off points
- Pressure – as scale builds up in the piping system it would (due to more scale dropping out of solution in hot water due to turbulence) create more encrustations in the hot water pipes than in the cold water pipes and these obstructions would adversely affect the balanced pressure (previously balanced by the PRV) required by ceramic disc mixers etc.,
- Heating efficiency –
 1. On heat exchange surfaces – 2mm build-up can result in a 15% decrease in efficiency
 2. On solar systems – 1mm build-up on heat exchange nubs results in up to 40% decrease in efficiency
 3. Inside pipe surfaces – 1mm build-up can result in a 10% decrease in efficiency due to the scale absorbing heat energy from the water as it passes over it.

- Electrolytic and chemical corrosion
 1. When water comes into contact with most metals, oxidisation causes the exposed metallic surfaces to degrade (i.e. iron plus water leads to rust because of the oxygen content in the water) This weakens the material and potentially lead to failure
 2. The resultant direct cost of either repairing or replacing the network can be significant. Also to be kept in mind is the resultant costs suffered by damage due to water damage etc.
- The decreased working life of appliances, machinery, pipework, fixtures and fittings caused by scale build-ups, as well as the costs of early replacement of affected items, downtime for industries and availability factors in the hospitality business
- Health issues -
 1. Although scale encrustations appear to be smooth they are actually microscopically honeycombed which makes them ideal breeding areas for bacteria, viruses and pseudomonas (such as Legionnaires disease) and other micro-organisms.
 2. Although most scale appears red, actual scale is a creamy white. The red colour comes from iron in the water which is absorbed into the encrustations. This absorbed iron can cause the formation of iron bacteria which while posing no threat to human health can lead to bad odours and staining.



As stated the Electronic Impulse Technology system of anti-scale treatment does have certain limits to its operation which must be brought to your attention

1. Ionic modification lasts up to 2 days in cold water before it starts to degrade
2. Ionic modification lasts up to 7 days in warm water (over 30°C) before it starts to degrade
3. Ionic modification lasts for a travelled linear distance of up to 2000m before it starts to degrade (the more bends and junctions in the pipe run, the longer the modification lasts)
4. If the iron (Fe) content of your source water exceeds 1ppm (maximum reading of 0.3ppm is applied internationally for drinking water) it is advised to install an iron removal filter prior the installation of the anti-scale system
5. If the manganese (Mn) content of your source water exceeds 0.1ppm (maximum reading of between 0.1ppm and 0.05ppm is applied internationally for drinking water) it is advised to install an specialised filter to remove the manganese prior the installation of the anti-scale system

We also urge to visit our website www.amanzirms.co.za/cwt-technology where you will find the technology behind the systems explained in greater depth.