

SCALE-BUSTER®

ISB® Technology

Scale-Buster: an electro-static and cavitational process with galvanic action which is specified and installed in industrial, commercial and domestic water treatment applications throughout the world



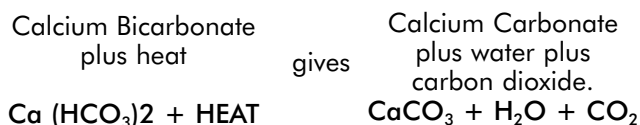
more information on our website www.therodingroup.co.uk

SCALE-BUSTER® REDUCES AND INHIBITS LIMESCALE

Lime-scale (Hard water)

When rain falls through the atmosphere, it takes into solution a certain amount of carbon dioxide making it slightly acidic. This acidity together with the fact that pure water such as rain water is a good solvent causes substances in the ground such as lime stone and chalk to be dissolved. They react with the acidity of the carbonic acid H_2CO_3 to form soluble salts.

These salts exist in the main as either relatively insoluble carbonates or quite soluble bicarbonates of calcium and magnesium. Carbonates are said to be substances which cause 'permanent' hardness and bicarbonates cause 'temporary hardness'. The latter creates most of the problems associated with hard water since the application of heat causes them to break down according to the following equation, thereby forming scale.



This reverses the original reaction between carbonic acid and the calcium carbonate. The insoluble calcium carbonate is deposited upon heating surfaces and pipes as a result.

Design description of Scale-Buster

Scale-Buster creates a number of separate effects which combine to produce a water conditioner that works satisfactorily over a wide range of conditions and water hardnesses.

Scale-Buster, through a unique combination of cavitation, dielectric charge and a large surface of zinc anode, enables the premature precipitation of calcium carbonate into the water stream by breaking down a significant proportion of the bicarbonates.

Dielectric action

Scale-Buster incorporates a large surface area of PTFE, a dielectric material. When water passes over the surface of the dielectric material, electrical energy is generated. This electrical energy passes harmlessly through the stream of water creating a de-stabilising effect, enabling the premature precipitation of calcium carbonate into the water stream by breaking down a significant proportion of bicarbonates.

Hydrodynamic action

Pressure effects are known to affect scaling potential. The decomposition of calcium bicarbonate releases

gaseous carbon dioxide and water. It is generally known that pressure determines the solubility of gases in water and therefore it can also have a bearing on the precipitation of scale particles. Within Scale-Buster carefully designed cavitation chambers create turbulence and pressure changes as the water passes through. This effect adds to the tendency for water to yield prematurely some of the scale with which it is saturated. Sonic effects created in the water by this cavitation help to keep the inside of Scale-Buster free from fouling due to algae or scale.

Anodic action

Scale-Buster also contains a large surface area of zinc which is bonded to the body of the unit by a unique patented dry connection. This removes any possibility of corrosion building up at the junction of the two metals which could seriously affect electrical conductivity. The electrolytic cell formed by the zinc and the body of the unit allows the slow release of zinc ions into the water stream which act as nuclei for scale formation.

Reducing scale and corrosion

The concentration of some of the dissolved substances within the water causes the water to become less saturated (saturation is the limit of solution of a substance in a given solvent). This allows this less saturated water to commence to dissolve old scale and rust deposits from the walls of pipes and heating appliances. Over a period of time, all old deposits can be flushed from a system.

Scale and the environment

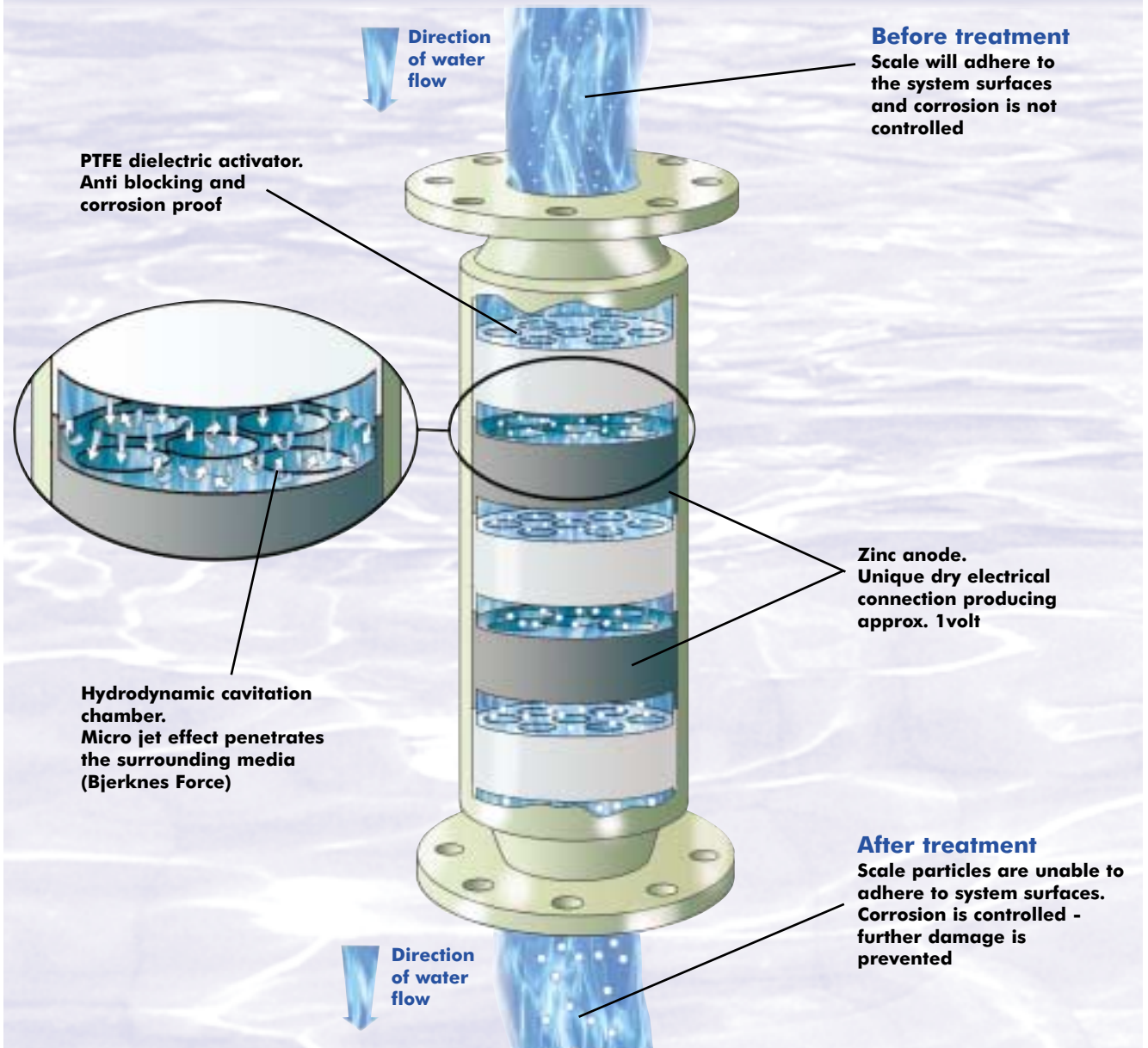
Scale-Buster must be the most environmentally sound method to combat hard water and corrosion scale since it uses no power or chemicals and requires no maintenance. It uses the kinetic energy of a moving stream of water through pipe-work to perform its task effortlessly over a very long time. It has been designed using serious methods of analysis including Laser Particle Analysis, which measures the size and distribution of particles passing through a water supply.

Today we are all becoming more aware of environmental issues. Scale-Buster has, for many years, been in the forefront of environmental awareness and will continue to produce a physical water conditioner that benefits these objectives.

TYPICAL PROBLEMS OF SCALING



Scale-Buster the preventative solution



- Self cleaning and maintenance free
- Prevents and removes scale and corrosion
 - Handles total water systems
 - Suitable for hard and soft water
- Operates without the use of chemicals, magnets or electricity

more information on our website www.therodingroup.co.uk

SCALE-BUSTER® REDUCES AND INHIBITS CORROSION

The link between scale and corrosion

“Slight corrosion of iron promotes the precipitation of calcium carbonate (Lime-scale), since the Fe_2+ ions enable the nucleation of $CaCO_3$ at low supersaturations”

E.REVAULT, J.BARON, J.LEDION, Influence des ions Fe^2 sur le pouvoir entartrant de l'eau.

“Because of their extremely commonplace nature, waters intended for human consumption might at first be considered as ‘simple’ fluids with regard to corrosion. In fact, this is by no means the case, since aqueous electrolytes possess specific features, which must be clearly understood in order to avoid corrosion problems”.

J.LEDION , Ecole Nationale Supérieure d'Arts et Métiers, Paris.

The problem

Corrosion is found in water pipes, water treatment devices and various appliances. It can even be proven that corrosion is a problem for various grades of stainless steel, corrosion with old-fashioned type galvanised systems can be an even bigger concern. Large sums of money are consumed for the refurbishment of pipes, systems and equipment.

Corrosion is the destructive attack of a material by reaction with its environment. Control of corrosion can be achieved by recognising and understanding corrosion mechanisms. According to the papers of English scientist Michael Faraday, it was established that, ‘most corrosion is electrochemical in nature.’ Since corrosion is an electrochemical process, it follows that electrochemical techniques and electrochemical devices can be used to prevent the corrosion process.

The solution

The Scale-Buster's method of action is electrochemical in nature. The galvanic effects of the special zinc anode offer cathodic protection to pipe-work upstream and downstream of the Scale-Buster. The zinc anode contributes to the precipitating effect on negatively charged particles. The zinc ions play an important part in breaking down existing rust and corrosion deposits through interchange with iron-based compounds.

The Scale-Buster ISB® technology precipitates carbonates from solution, therefore, water becomes less saturated and is thus able to slowly start dissolving old scale and corrosion encrustation in water systems reducing pressure drops due to restricted flow and saving energy in heating/cooling appliances and systems.

The Scale-Buster's active-anode is connected to the body of the unit using a unique dry electrical connection, in combination with its PTFE turbulence/cavitation chambers corrosion build-up within the units is prevented.

Once the existing corrosion is cleared, the unique internationally patented design of the Scale-Buster prevents further attack in metal systems by forming a passive layer of magnetite (Fe_3O_4) on the systems surface.

Normally very corrosion resistant materials, which rely on thin oxide films for protection, such as stainless steel, can suffer from pitting and crevice corrosion attack. These materials rely on oxygen being present, so that they can maintain their oxide films (passive state). When oxygen is excluded and the oxide films break down, the material surface becomes active and corrodes readily.

Even stainless steel used in drinking water applications can corrode due to the chloride content.



Corrosion

SCALE-BUSTER® HELPS PREVENT BACTERIA ALGAE AND SLIME

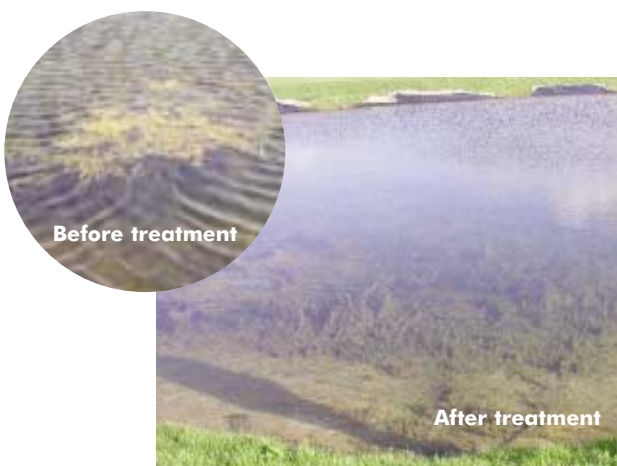
The Scale-Buster ISB® technology combines several effects, which help to prevent the environment in which bacteria, algae and slime thrive. The most obvious way in which Scale-Buster creates hygienic conditions is by removing hard water scale and corrosion from pipes and heating surfaces. It is a well-known fact that scale provides an excellent breeding habitat for bacteria and germs. This scale can provide breeding grounds for bacteria. Clean smooth surfaces provide no haven for germs.

The two effects outlined below are little known and unique to Scale-Buster's patented design.

Dielectric material (PTFE) in specially designed passages and cavitation chambers create capacitive effects due to the generation of 'static charge' on the boundary layer of the PTFE. These very large surface areas of PTFE have the effect of neutralising charged colloidal particles. Colloidal particles are kept in suspension by their possession of like charges. They constantly repel each other and remain in suspension as extremely small particles. By neutralising these charges, they flocculate to form larger particles, which can absorb nutrients vital to bacteria.

The presence of a large surface area of zinc anode causes the release of minute amounts of zinc together with oxides of zinc formed at the cathode (in this case metal pipes and vessels). These act as coagulants as well as acting as nuclei to initiate the formation of large particles.

This production of a floc enables treatment by filtration. Meanwhile many nutrients essential to the growth and sustenance of bacteria have been eliminated, binding them up in the floc particles.



Scale-Buster has many applications beyond the most obvious such as cooling towers and hot/cold water systems. For instance, irrigation water in ponds and reservoirs can be pre-treated to avoid contamination by algae and slime, which need nutrients to propagate.

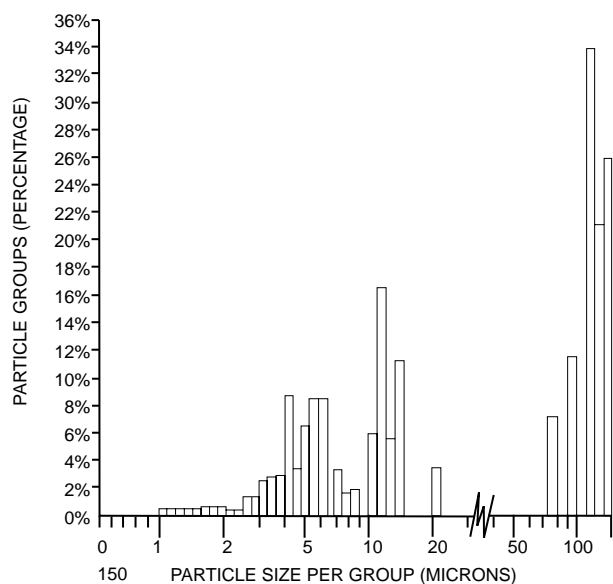
SCALE-BUSTER® IMPROVES FILTRATION

Scale-Buster's principle effect on hard water is to precipitate greatly enlarged particles within the water stream. Suspended colloidal particles also appear to be caught up in this coagulation effect so that filtration is enhanced.

Scale-Buster begins by creating calcium carbonate and corrosion particles that coagulate with the organics creating larger particles. These larger particles can be extracted from the water flow by a filtration system followed by periodic blow-down only of the filter. Scale-Buster can also help enhance the existing method of chemical dosing, as the water in the system is kept cleaner, therefore, reducing the quantity of chemicals and extend re-generative systems.

Laser Particle Analysis

The Scale-Buster was tested by the GALAI CIS 100 Computerised Inspection System back on the 18th August 1993. The results supplied by GALAI demonstrated the formation of Large Particle formation. Only the Scale-Buster with its patented ION Active Anode in combination with the Dielectric PTFE turbulence chambers shows these positive results.



Algae, slime and filtration

QUESTIONS AND ANSWERS

Will Scale-Buster affect water pressure and flow rates?

The internal configuration of Scale-Buster does not noticeably impede the flow or pressure loss with flow rates up to 2 metres per second.

Is the water treatment dependent on flow rates?

Unlike many other physical water conditioners, Scale-Buster will perform well across a wide range of flow conditions.

Does turbulent flow affect the performance of Scale-Buster?

No. The design of Scale-Buster creates turbulence within its structure in order to improve the treatment effects.

How quickly will Scale-Buster clean a system?

The time taken will depend on several factors; the internal condition of pipework and appliances; the thickness of scale deposits and the distance of affected areas from the Scale-Buster. The actual volume of water passing through Scale-Buster will determine the length of time taken to clean scale from the system. However, once installed, Scale-Buster will commence its job immediately provided that a water flow is still possible.

Will Scale-Buster soften the water?

Not in the strict sense of the word 'soften'. However, because some of the dissolved hardness is precipitated from the water, soap and detergent economies are made possible. A 'soft' feel to water is often noticeable.

Is the taste of water affected?

Scale-Buster does improve the taste of water by 'masking' unpleasant flavours such as chlorine as these are absorbed in the precipitated particles.

Will it save energy?

Yes. Because Scale-Buster will remove existing scale build up on heating surfaces, such as hot water heaters and tanks, less fuel is required to heat the water. A thickness of scale of only 3 mm can add 25% to energy costs.

Why is Scalebuster better than Magnetic Units?

The ideal magnetic unit is designed to create magnetic lines of force at right angles to water flow. This,

according to Faraday's laws, creates an electrical e.m.f. which causes changes within the water molecules. Unfortunately, too slow a flow can limit the e.m.f. produced and too fast a flow creates turbulent flow, which can affect the design criteria. Scale-Buster is much more versatile by being less dependent on flow conditions and also has the benefit of protecting against corrosion due to its patented special zinc anode incorporating a dry electrical connection.

Where should Scale-Buster be situated in relation to equipment?

Ideally the Scale-Buster should be located at least a few metres from the equipment to be protected by the device. This allows the growth of precipitated particles of scale to take place before the water reaches heat-producing and scale-forming areas.

How long does the effect last?

Compared with other devices, Scale-Buster has been developed with the size of precipitated particles being a prime consideration. Large particles have a much smaller surface area than their equivalent mass made up of relatively smaller particles. For this reason, they are much slower to re-dissolve in the water and subsequently the treated water has long-lasting effects. Water treated using Scale-Buster is likely to continue to do its job of removing old scale deposits from pipework for much longer than competitive products, which produce much smaller particles. The manufacturers were the first to use laser particle analysis to determine precisely what physical effects their product generated.

Why is it necessary to earth the Scale-Buster?

The changes, which take place in the Scale-Buster, relate mainly to the precipitation of carbonates arising from the breakdown of dissolved bicarbonates. When any change takes place in the chemical structure of a substance that results in at least a temporary change in its constituents, there is a corresponding change in electrical charge. If this charge is not allowed to neutralise which in the case of the Scale-Buster is by means of grounding the charge to a suitable earth connection, then the desired changes may be restricted or limited in duration.

Designed and manufactured in UK by Ion Enterprise Ltd.

Scale-Buster Patent EUR 949047/12.0. Quality ISO 9001:2000 ISOQAR Certificate No. 1185/96

The manufacturer reserves the right to change the specification without prior notice.



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Other Major Water Treatment Products

- Cyclone filtration
- UV disinfectant
- Chlorine dioxide treatment

Literature Available

Literature available on all products

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