

EVOLET

Scale Prevention Technology



Green Technology

Evolet® systems meet or exceed all green initiatives as a member of the U.S. Green Building Council.



Environmentally Friendly

Evolet® systems utilize materials that do not leach harmful chemicals back into the ground water supply.



No Monthly Maintenance

No monthly maintenance required on all Evolet® systems saving you time and money.



No Corrosive Salts or Chemicals

No more 40lb bags of salt or worrying about corrosion to pipes or appliances caused by salts when using a water softener.



No Slimy/Slippery Feel

Your water will be smooth and gentle "sodium free". No more slippery can't get the soap off feeling.



Third Party Tested & Certified

Evolet® is WQA Gold Seal Certified and Tested to NSF/ANSI Standard 61 for material safety and also tested by DVGW.



No Wasted Water or Electricity

Evolet® systems do not require electricity or backwashing. Save money and water with zero electricity usage or water waste.

THE SCALE PROBLEM

What is Scale?

Many building owners and maintenance personnel are all too familiar with the troubles of scale. But, just what is it? Scale is an incrustation of calcium carbonate (CaCO_3) that forms on imperfections on heating elements or within plumbing systems. It is primarily composed of calcium (Ca^{2+}), magnesium (Mg^{2+}) and bicarbonate (HCO_3^-). Scale deposits grow over time and are highly insoluble, making scale extremely difficult to remove once formed and often leading to costly remediation efforts.



Hard scale build up on exterior of copper pipe in plumbing system.

Why is Scale Harmful?

There are a number of issues associated with the growth of scale. First, as scale forms over time, it reduces the inner diameter of pipes and elbows, ultimately leading to restrictions in flow rate and pressure loss problems in systems. Second, scale often becomes encrusted on internal moving parts of valves & components, affecting their intended purpose or worse, causing safety failures. Lastly, in a boiler or hot water tank, heating elements can become coated with scale, reducing system efficiency and increasing operating costs for end users.



This temperature and pressure relief valve has become clogged with the accumulation of hard scale, which can lead to potentially dangerous conditions.

OTHER SCALE CONTROL TECHNOLOGIES



Water Softeners

the most common approach to dealing with scale was the installation of a water softener. The never-ending consumable cost of salt, required for system regeneration, is expensive and must be considered in the overall cost equation. Although effective in dealing with most scale, water softeners come with some significant drawbacks including:

- * Harmful chloride discharge that negatively impacts the environment
- * The removal of beneficial minerals (calcium & magnesium) from drinking water
- * A backwashing and regeneration process that wastes water
- * Large floor space requirements for operation and storage of salt bags



Scale Inhibitors or Sequestrates

Scale sequestering systems introduce phosphate-based chemicals to inhibit scale. These systems work better in cold water applications but have a tendency to break down or fail in hot water. Similar to softeners, scale sequestering systems require the constant introduction of a chemical resulting in ongoing monthly costs to end users.



Magnets and Other Devices

Magnets, electro-magnets, radio frequency devices, electrical current systems and other "black magic" inventions have failed to pass any scale control standards designed by internationally recognized 3rd party testing agencies. While the manufacturers of these products may have in-house data to support their amazing scale control claims, none of these products have ever passed any international protocol for scale prevention. "Buyer Beware" is the best advice one can take if considering this gadgetry.

EVOLET **ZERO** Pollution / Electric / Maintenance SC3 Anti-Scale Media

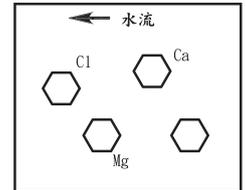
How Does Evolet SC-3 Works

Evolet® is a scale control technology designed to protect complete plumbing systems or individual components from the negative effects of water hardness. Evolet® prevents what is called "hard" scale, the destructive scale that sticks to pipes, valves and other system components. It does this by transforming dissolved hardness minerals into harmless, inactive microscopic "soft" scale crystal particles. Those particles stay suspended in the water and flow freely through

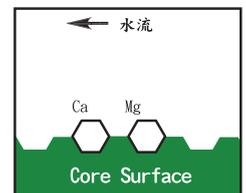


Evolet SC3 product has been tested and certified by the Water Quality Association according to NSF/ANSI 61 for material safety only.

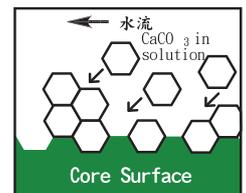
a system, unable to stick to plumbing imperfections. Calcium carbonate in pre-existing scale will slowly "redistribute" itself from the low-surface area of pipe surfaces and plumbing to the high surface area of all the crystals in solution. The trillions of microscopic crystals of activated lime provide an incredibly high total surface area for further epitaxial crystallization. The next result is removal of pre-existing lime scale from plumbing, keeping pipes and appliances lime-free whilst leaving a thin protective surface!



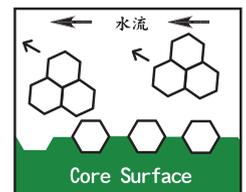
Suspended Minerals



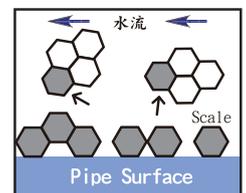
Attachment



Crystallization



Release



Old Scale Removal



Crystal photo taken with a Scanning Electron Microscope.

Evolet Features

- No salt or chemicals required
- Upflow design for better flow rates
- No backwashing and zero discharge
- Virtually maintenance free
- Consistent scale control performance
- Uses environmentally friendly "green" technology
- Long-lasting media needs no regeneration

Evolet Specifications

Bulk weight	750 kg/m ³	Free board up flow	60-70%
Specific surface	270 m ² /g	Service flow rate	30-50 m/h
Colour	Light Yellow	Design concept at 250 ppm	2.0-3.5 liters per 1000 l/h flow
Mesh size	0.5-0.8mm	Design concept at 500 ppm	3.5-6.0 liters per 1000 l/h flow
Mesh size ≤ 0,3 mm	3.0%	Operating temperature	5°-70° C
Mesh size ≥ 1,2 mm	3.0%	pH Range	6-9
Volume change in water	Max. 60%	Media Lifetime	2-3 years
Moister Content	24-28%	Chemical free, No backwash, No valve, No electricity	

The Problem

Calcium creates scale in pipes, on appliances and other plumbing surfaces. This leads to higher heating and energy costs and expensive repairs to appliances, such as ice machines, coffee makers, dishwashers and cooling towers in commercial buildings. Scale can also be a source for bacteria to grow, which can be a health concern in drinking water applications. Calcium on the other hand, is important to human health, and supplements are recommended if calcium is reduced or totally voided in ones diet.

The Solution

Evolet SC3 Anti-Scale systems transform calcium ions into calcium crystals, which are stable and cannot attach to pipes, surfaces, hardware, fixtures or heat exchange components. The crystals are so small they are easily rinsed away by the water flow.



(Pipes before treatment)



(Pipes after treatment)

As proven at independent testing facilities Evolet SC3 will prevent calcium scale formation. Tests were performed using side-by-side glass vessels with heating elements (heated to 180°F) to simulate performance of a hot water heating system. Water, with 16-17 grains of hardness, was treated at specific flow rates. The testing proves that Evolet SC3 Anti-Scale Media prevents scale formation and “de-scaling” was observed after only 3 weeks of treatment.



Side-By-Side Test Stand



Scale Build Up



No Scale!



Descaling

The Principal Behind Evolet Anti-Scale Media

The principal behind our Evolet SC3 Anti-Scale Media is quite simple. The Evolet SC3 Anti-Scale Media acts as a dosing catalyst by accelerating the transformation of the calcium and magnesium minerals into harmless “Nano” particles. When the raw inlet water enters into the water conditioning tank the up flow pulls the water through the fluidized Evolet SC3 Anti-Scale Media. Evolet SC3 then acts as a dosing catalyst by pulling the calcium and magnesium hardness minerals out of the solution and transforming these minerals into inactive “Nano” crystal particles. Because the hardness minerals have been transformed into “Nano” particles, these particles make their way through plumbing systems without attaching to pipes, fixtures, valves, or heating elements. An important secondary benefit is that the existing scale in pipes and equipment is also dissolved over time. The calcium and magnesium already built up on the walls of pipes and equipment will slowly dissolve and in just a few short weeks mineral build up will be eliminated.

EVOLET SC3 Anti-Scale Technology

Chemistry of Evolet SC3

Evolet SC3 Is a process used in water treatment to make a chemical reaction in water with NANO dosage of Calcium Hydroxide.



- Evolet SC3 softening involves a relatively complicated series of chemical reactions which will be discussed now. The goal of all of these reactions is to change the calcium and magnesium compounds in water into calcium carbonate and magnesium hydroxide. these are the least soluble calcium and magnesium compounds and thus will settle out of the water at the lowest concentrations. For example, calcium carbonate as now crystals, will settle out of water.
- In order to produce calcium carbonate and magnesium hydroxide, the pH of the water must be raised by the addition of Evolet SC3. Calcium compounds in water will be removed at a pH of about 6.8 to 7.5 while magnesium compounds require a pH of 7.0 to 8.0. When Evolet SC3 is used to remove noncarbonate hardness, an even higher pH is required - 7.5 to 8.5 for calcium compounds and 8,5.0 to 9.0 for magnesium compounds.

Removal of Carbonate Hardness

- Once Evolet SC3 is in service it is free to react with and remove carbonate hardness from the water. Calcium compounds react with SC3 in the reaction shown below :

Calcium bicarbonate + **EVOLET SC3** \rightleftharpoons Calcium carbonate + Water + Carbondioxide



- We have focussed on calcium bicarbonate since it is the most common calcium compound in water, but other calcium-based hardness compounds have similar reactions. In any case, the calcium carbonate produced is able to precipitate out of solution as nano crystals.

Magnesium compounds have a slightly different reaction. First, Magnesium bicarbonate reacts with SC3 and produces calcium carbonate (which precipitates out of solution) and Magnesium carbonate.

Magnesium bicarbonate + **EVOLET SC3** \rightleftharpoons Calcium carbonate + Magnesium carbonate + Water Carbondioxide



- Then the magnesium carbonate reacts with SC3 and creates more calcium carbonate and magnesium hydroxide. Both of these compounds are able to precipitate out of water as nano crystals.

Magnesium carbonate + **EVOLET SC3** \rightleftharpoons Calcium carbonate + Magnesium hydroxide



Evolet SC3 Anti-Scale Media Development

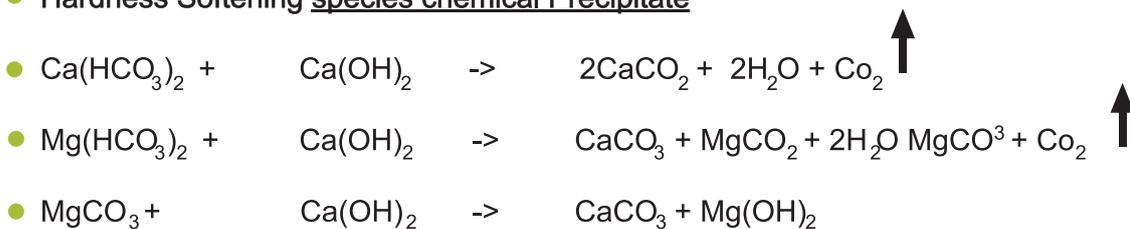
Our environmentally safe Evolet SC3 Anti-Scale Media was initially developed by ROTEK Water to serve as an alternative to commercial softeners used for scale control. Because commercial softeners discharge sodium into waste water supplies during the regeneration process many companies were faced with expensive discharge fees and government permits and they needed a cost effective alternative. Another reason for the development of the Evolet SC3 Anti-Scale Media was to address the heightened concern by health and research agencies that through the use of residential softeners calcium and magnesium were being removed from home water supplies and causing serious health problems due to the lack of these vital minerals and the excess of sodium in the drinking water. Evolet SC 3 Anti-Scale Media developed by ROTEK Water addresses both of these concerns and is a major breakthrough in the water treatment market for both commercial and residential applications. Evolet SC3 Anti-Scale Media has proven to be a successful alternative to commercial and residential softeners.

Evolet SC3 Nano Technology

- Chemical precipitation is one of the most common methods to make NANO crystals. The chemicals normally used is calcium hydroxide. SC3 is used to remove the chemicals that cause the carbonate hardness.
- When SC3 adds NANO calcium hydroxide, the hardness-causing minerals form nearly insoluble precipitates. When calcium hardness is removed in a chemical softener, it is precipitated as calcium carbonate (CaCO₃). When magnesium hardness is removed in a chemical softener, it is precipitated as magnesium hydroxide (Mg(OH)₂). These precipitates are removed by the processes of filtration. Because the precipitates are very slightly soluble, some hardness remains in the water usually about 50 to 85 mg/l (as CaCO₃).

This hardness level is desirable to prevent corrosion problems associated with water being too soft and having little hardness ions.

- Hardness Softening species chemical Precipitate



- CO₂ = carbon dioxide, Ca(OH)₂ = calcium hydroxide or hydrated lime, CaCO₃ = calcium carbonate, Ca(HCO₃)₂ = calcium bicarbonate, Mg(HCO₃)₂ = magnesium bicarbonate, MgCO₃ = magnesium carbonate, Mg(OH)₂ = magnesium hydroxide, MgSO₄ = magnesium sulfate, CaSO₄ = calcium sulfate, H₂O - water.

EVOLET Anti-Scale Systems Applications

Applications :

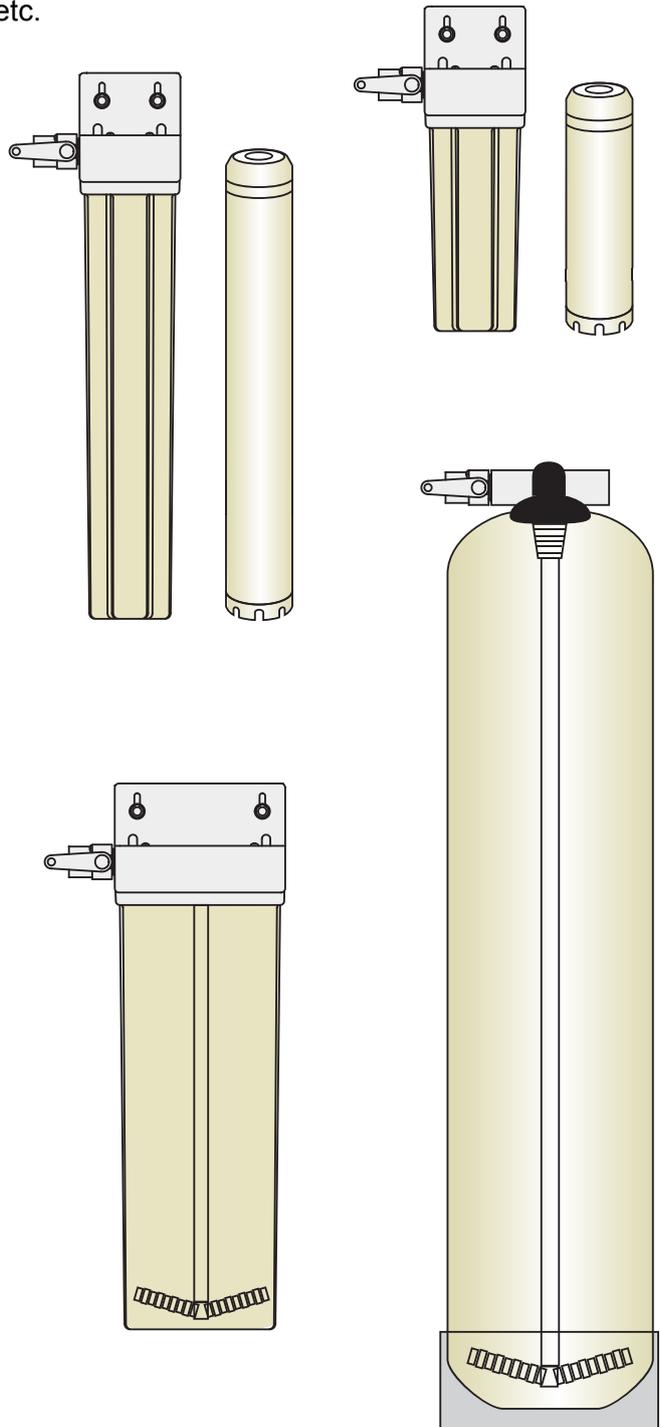
Water Heater, Coffee Machine, Beverage Machine, Dish Washer, Ice Maker, Boilers, Cooling Tower, Solar Water Heater, Reverse Osmosis System..etc.

Filter Housing Design Recommendations		
Housing	Threads	Flow Rate
10"	1/4"	75LPH
10"	1/2"	100LPH
20"	1/2"	200LPH
20"	3/4"	400LPH
20"BB	1"	750LPH
20"BB	1"	1500LPH

Filter Vessel Design Recommendations		
Vessel	Threads	Flow Rate
10 x 35	1"	1750LPH
10 x 54	1"	2500LPH
13 x 54	1"	3250LPH
14 x 65	1"	4000LPH
16 x 65	1.5"	6000LPH
21 x 62	1.5"	10000LPH
24 x 72	2"	15000LPH
36 x 72	2.5"	30000LPH

Evolet SC3 Package : 60Liters / Drum

Please contact with the nearest distributor to calculate how much media you will need for each project.



Products Advantages Comparison Chart

	EOLET	Softener	Chemical	Magnet
Set-Up Cost	Middle	High	Low	Middle
Electric Required	None	Yes	Yes	Yes
Drain Water	None	Yes	None	None
Chemical Release	None	Yes	Yes	None
Life Span	3 Years	1-3 Years	0.5 Year	3-5 Years
Efficiency	Good	Good	Normal	Bad
Drinking Impact	Harmless	Minor Harmful	Harmful	Harmless
Maintenance	Low	High	Middle	Low

Cost Comparison between Evolet and Water Softener

Project Criteria :

Capacity = 90M3/Day, Total Hardness = 150ppm (CaCO₃), 300Liters Softener Resin

Salt needed / Day = 300L x 0.41 = 42kg

Salt cost in 3 yrs = (42kg x US\$0.15) x 360 day x 3 yrs = **US\$6,800**

Water Regeneration Cost = (1M3 /day=US\$0.3) x 360 x3 yrs = **US\$324**

Resin Replacement Cost = 300L x US\$2 = **US\$600**

Water Softener Total Operating Cost for 3 yrs = US\$7,724

Evolet Anti-Scale System

Media Replacement for ONLY US\$2,850

**No regeneration No more salt No waste water
Environmental Friendly**