SP3

Revolutionary

Scale Prevention Media

with CBT

FILTERSORB® SP3

- NSF 61 Certified
- No Chemicals
- No Regeneration
- No Backwash
- No Valve
- No Electricity
- No Maintenance

Watch

MONARCH WATER

Leading manufacturers of scale prevention media and systems

Table of Contents

Introduction

FILTERSORB®SP3 is the result of extensive research work along with its undisputable success in the worldwide market since 2005.

Watch®'s core motivation for developing this product was to find an alternative to conventional ion exchange based water softeners, reverse osmosis or other chemical based systems that prevent scale.

Recent restrictions in certain parts of the world placed upon the above mentioned technology led to an environment friendly, cost effective solution for hard water, Watch®'s **FILTERSORB® SP3.**

Description of FILTERSORB®SP3 Scale Prevention:

FILTERSORB®SP3 completely takes care of the primary cause of scale forming cations i.e. Ca^{2+} and Mg^{2+}.

Working Principle:

When the hard water under goes nucleation in the pressure vessel, the calcium bicarbonate $Ca(HCO_3)_2$ is transformed into an aragonite form of calcium carbonate $CaCO_3$ crystals. These crystals are formed through a decomposition and crystallization process, forming very stable harmless crystals.

The following equation describes the reaction that occurs inside the pressure vessel when flows over the glass coated ceramic beads. This formula is the basis of the nucleation.

$$Ca(HCO_3)_2 \rightarrow CaCO_3 + CO_2 + H_2O$$

The name fragment '**SP** (**S**cale **P**revention) **3'** is to indicate this unique transformation of water hardness $Ca(HCO_3)_2$ into **3** components i.e..

1. $CaCO_3$ (micro-crystals)
2. CO_2 (colloid)
3. H_2O (pure)

In the pressure vessel, the equilibrium of carbonate species in water is changed, assisted by the driving force of stable crystal formation. This reaction is called 'pushed to the right →'.

This reaction ensures, as long as CO_2 is being removed, the soluble $Ca(HCO_3)_2$ converts into insoluble calcium carbonate ($CaCO_3$) crystals. The calcium carbonate crystals grow steadily and are **very stable** and **cannot dissolve** (incapable of forming scale) in the water.

CO_2 removal is guaranteed during the lifespan of **FILTERSORB® SP3**

Nucleation Assisted Crystallization or **(NAC)** should not be confused with TAC…

Template Assisted Crystallization is where the crystals form on a template on the bead surface, but is only effective whilst the beads surface remains intact.

Nucleation Assisted Crystallization is the self-assembly of permanent non scale forming crystals on the beads surface. However, Filtersorb SP3 beads have a unique double glass coating (CBT) to ensure surface protection and guaranteed performance.

Nucleation Assisted Crystallization (NAC) through CBT.

Once formed and detached from the surface of **FILTERSORB®SP3** media beads, the crystals will not adhere to any other surfaces, even in the case of hot water applications. The crystals cannot form scale because of its stable molecular structure and neutral surface electro potentiality.

NAC is the basis of reliable **S**cale **P**revention capability of **FILTERSORB®SP3.**

The transformation of water hardness takes place in the following steps:

1. Continuous transformation of water hardness makes immediate crystal growth possible with unidirectional chemical equilibrium i.e. $Ca(HCO_3)_2 \rightarrow CaCO_3 + CO_2 + H_2O$
   As CO_2 leaves quickly, the right hand direction of the equation is preserved.

2. The crystals developing on the surface of the **FILTERSORB®SP3** bead grow rapidly and nucleate using the formed CO_2 micro-bubbles (colloid gas) as the template.

3. After a certain period of time the micro-emulsion of CO_2 & $CaCO_3$ forms hollow particles & leaves the media bead surface in neutral form. The average dimension of $CaCO_3$ crystal coated globules ranges in micro-meter. The noted reaction time is normally less than 4 seconds.

By definition, a catalyst speeds up a process by lowering the activation energy barrier required for the transformation of the reactants or their meta-stable intermediates into the product.

The calcium and magnesium bicarbonates from water are forming meta-stable amorphous carbonate particles, by liberating CO_2. This process is reversible since the stability of the amorphous particles is low, and therefore these particles re-dissolve and have a relative short lifetime.

However, once the amorphous particles reach the catalytic surface of **FILTERSORB® SP3 (2)** they undergo transformation into carbonate crystals **(1).** Since the crystals are stable compared with amorphous particles, the process is not reversible and crystals leave the **FILTERSORB® SP3** surface.

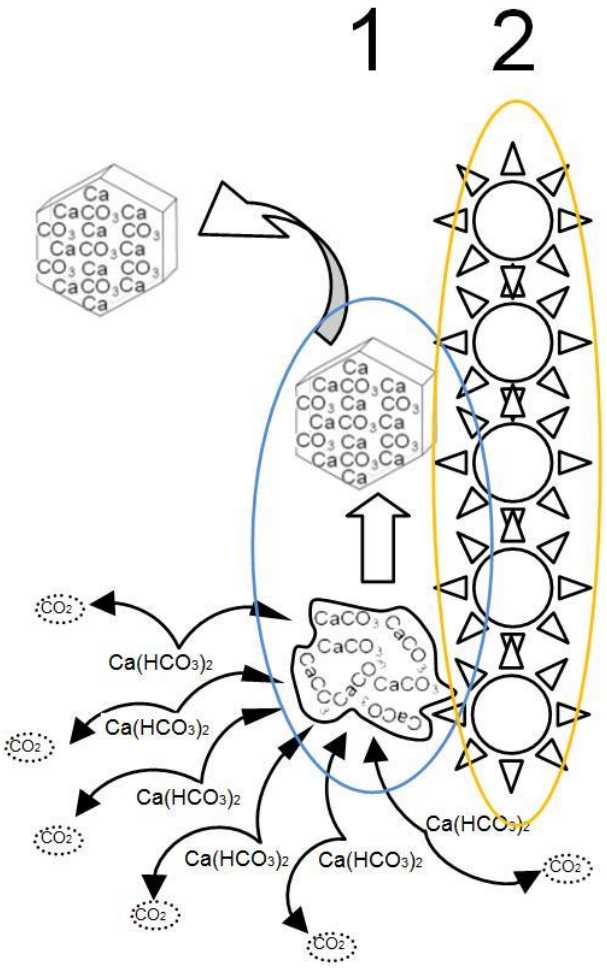
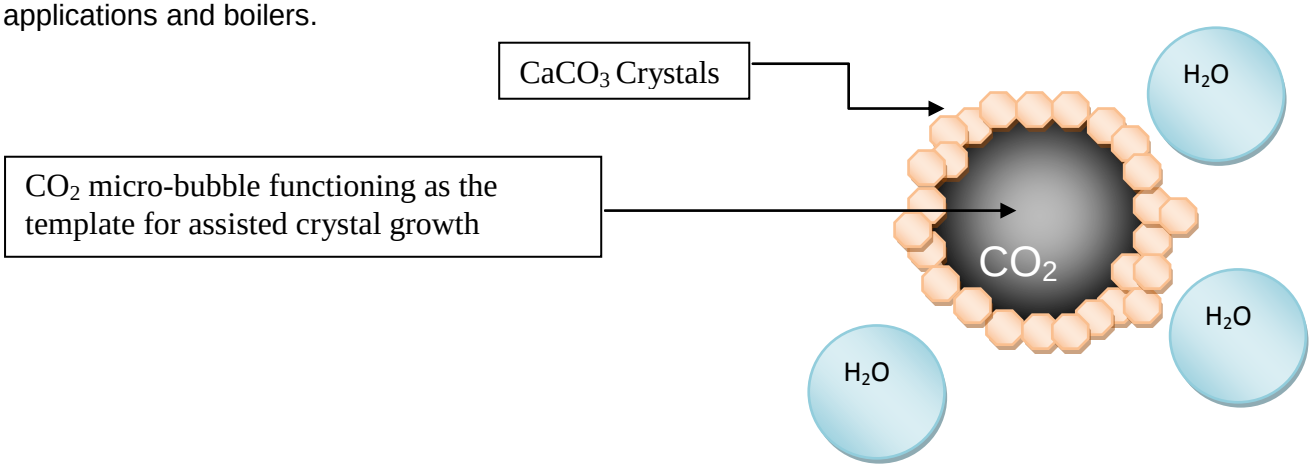


Diagram 1 2 © Watch®

FILTERSORB® SP3 formed crystals can sustain a temperature up to 380°C, before a structural breakdown back to the calcite form. This property of the transformed hardness makes the treated water perfect for hot water applications and boilers.



During the flow some of the micro-bubbles are losing a small amount of CO2, which diffuses rapidly in water and interact with surface scale, especially in closed spaces (pipes, boilers, etc). As a result, the scale which is already present on these surfaces is slowly softened and removed.

NAC via Filtersorb SP3, is the only form of water treatment that can guarantee permanent crystal creation that will not revert back to the calcite form (scale creation). This together with its CBT ensures longevity of the beads and performance.

Micro Crystals and Colloid CO_2...

The story behind pH stabilization of **FILTERSORB® SP3** treated water

Influence of formed $CaCO_3$ as pH balancing factor:

- The reaction: **$Ca(HCO_3)_2 \rightarrow CaCO_3 + CO_2 + H_2O$** is unidirectional while **SP3** is transforming the hardness into insoluble crystals.
- In the nucleation assisted crystallization process, formed CO_2, stays as **colloid gas** and interacts rapidly with crystals growing in the nucleation site.
- This emulsion of $CaCO_3$ micro-crystals & CO_2 micro-bubbles forms hollow particles
- Formed hollow particles have both internal and external faces belonging to the aragonites which separate the surrounding water from the enclosed gas cavity.
- Hence, the reverse reaction of CO_2 with water forming Carbonic Acid is not possible and the **pH stability is maintained**. In fact every excess $CaCO_3$ crystal will buffer any carbonic acid left over.

Why we consider FILTERSORB®SP3 to be the BEST?

- **No TDS change;** as **FILTERSORB®SP3** does not remove or add anything to the water. As no ion-exchange chemistry is used, the **TDS** of the water remains unchanged before and after the treatment.

- **No pH change:** The **pH** value of the water remains the same. This factor makes the treated water suitable for almost any use where corrosion is concerned. **PhACT™** - pH Advanced Crystallization Technology

- **Minerals Preserved: FILTERSORB®SP3** does not add sodium or any chemicals to the water. It simply preserves the Calcium and Magnesium contents of water, making the treated water arguably the healthiest mineral water available. Both Calcium and Magnesium are quintessential for nervous systems & muscles functionalities. They are indispensable parts in the cell chemistry of the plants and most of the life forms on earth.

- **De-Scaling:** Not only does **FILTERSORB® SP3 water** prevent scale formation, but it also helps to remove the previously formed scale by crystal abrasion during the flow of water. Additionally, during flow, some of the micro-bubbles lose a small amount of CO2, which diffuses rapidly in water, and interact with surface scale making it softer, especially in closed spaces (pipes, boilers, etc). As a result, this soft scale which is present on these surfaces is gradually removed.

- **Biocides:** The **NAC** process creates the conditions that water dissolved CO_2 agglomerate to form micro-bubbles. These CO_2 bubbles actively destroy bacterial membranes acting as a biocide. So along with the scale prevention **FILTERSORB®SP3** also helps prevent Biofouling.

- **Ceramic Bead Technology**: Unlike other forms of similar treatment, NAC is the self-assembly of permanent non scale forming crystals on the beads surface. **FILTERSORB®SP3** beads have a unique double glass coating (CBT) to ensure surface protection and guaranteed performance.

Advantages of FILTERSORB® SP3 :

• Environmentally friendly.
• No back-washing required.
• No power supply (electricity) required.
• No chemicals added to the water.
• Removes the previous scale in the system.
• Catalytic process converts **Ca** and **Mg** into harmless micro crystals.
• Maintenance free. No extra cost incurred.
• No chemicals required for disinfection
• No drain connections required.
• No control valves required.
• Very easy to install.

Technical Data:

Characteristics	
Appearance	White granules
Composition	Ceramic modified polymer
Bulk weight (kg/l)	0.80
Particle size (mm)	0.55 - 0.75
Change in volume	up to 60%
Moisture content	10-25%

Operational parameters & water impurities	
Operating temperature (°C)	3 to 90
pH range	6.5 to 9.5
Hardness, max. ppm	1400
Salinity, max. ppm	35000
Iron, max. ppm	0.5*
Manganese, max. ppm	0.05
Free chlorine, max. ppm	3
Copper, max. ppm	0.3
Oil	free
Hydrogen sulphide	free
Phosphates	free

*Important: *Filtersorb® SP3 is also able to remove Iron from water with very high efficiency. Iron removal will take preference over crystal creation in iron contaminated water. For further details please contact us.*

Lifespan of the Media:

The effective average domestic lifespan of **FILTERSORB® SP3** is 3 to 5 years. ,
In commercial applications, this figure is 2 to 3 years.
Both lifespans are dependent on localised water conditions.

Online Presentation Material

- Scaleout web site downloads showing approvals and a selection of UK test sites

Certification for FILTERSORB® SP3

(Click the links below to see the relevant documents in your web browser)

- FILTERSORB SP3 Tested for Drinking Water Standard in Poland
- FILTERSORB SP3 Tested for Drinking Water Standard in Hungary
- FILTERSORB SP3 with Activated Carbon -Tested for Drinking Water Standard in Hungary
- FILTERSORB SP3 Tested to meet BS 6920 Standard (British Standard, UK)
- FILTERSORB SP3 Tested to meet WRAS (Water Regulations Advisory Scheme, British Standard, UK) Standard of Product Quality and High temperature
- Bella Vista (Malta) installation with Filtersorb SP3
- Click here to view NSF 61 Listing of FILTERSORB SP3 from WQA

Applications:

- Water pipes
- Shower heads
- Toilets
- Beverage systems
- Dish washers
- Ice makers
- Ice cubers
- Washing machines
- Commercial boilers
- Pressurized/unvented cylinders
- Domestic boilers
- Solar heating systems
- Hot water cylinders
- Air conditioners
- Water heaters
- Air humidifiers
- Coffee machines
- Tea makers
- Water coolers
- Catering water boilers
- Coffee/vending machines
- Pool heaters
- Car washing
- Dairy processing
- Nurseries
- Food and beverage making
- Breweries
- Commercial water heaters*
- Industrial hot water boilers*
- Closed circuit cooling towers
- Open circuit cooling towers
- Concrete cooling towers
- Cross flow cooling towers
- Wineries
- Injection moulding
- Irrigation
- Reverse osmosis pre-treatment

*denotes with blow down

FILTERSORB® SP3 systems can be installed anywhere where Scale Prevention is concerned.

Its unique working method (pH stability), permanent cost effective scale prevention & removal, ease of design & installation (simple in & out connections), makes **FILTERSORB® SP3** the ultimate choice for both residential and commercial applications.

Watch® is the manufacturer of scale prevention media FILTERSORB® SP3

Monarch Water Ltd is the official distributor for the UK of FILTERSORB® SP3

FILTERSORB® SP3 is marketed under the Scaleout™ name in the UK.

For detailed information please visit our website: **www.scaleout.co.uk**

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MEMBER Water Quality ASSOCIATION