



# Watch Water USA

## Filtersorb SP3 Anti-Scale Water Treatment Systems

### 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

Filtersorb SP3 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 Filtersorb SP3 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 Filtersorb SP3 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!



De-Scaling



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## Filtersorb SP3

The technologically advanced Filtersorb SP3 Anti-Scale Media is an innovative solution that prevents all of the negative effects of calcium and magnesium, while allowing the positive health benefits to remain. The system is maintenance free, salt free and does not require costly regeneration and backwashing.

## The Principal Behind our Anti-Scale Media

The principal behind our Filtersorb SP3 Anti-Scale Media is quite simple. The Filtersorb SP3 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 Filtersorb SP3 Anti-Scale Media. Filtersorb SP3 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.

## Filtersorb SP3 Anti-Scale Media Development

Our environmentally safe Filtersorb SP3 Anti-Scale Media was initially developed by CWG/Watch 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 Filtersorb SP3 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. Filtersorb SP3 Anti-Scale Media developed by CWG/Watch Water addresses both of these concerns and is a major breakthrough in the water treatment market for both commercial and residential applications. Filtersorb SP3 Anti-Scale Media has proven to be a successful alternative to commercial and residential softeners.

## Our Unique Manufacturing Process

CWG/Watch Water has worked closely with our customers to understand their problems, explore possible solutions, and then bring those solutions to life through our top of the line scientific and manufacturing capabilities. CWG/Watch Water's manufacturing process is unique to our Filtersorb SP3 Anti-scale Media and is currently awaiting patents for its exclusive manufacturing process and advanced technological design. Our Filtersorb SP3 Anti-Scale Media is manufactured in a clean room environment and has a long manufacturing cycle which goes through multiple manufacturing processes. Currently, CWG/Watch Water is at full production and has expanded into a new 60 thousand square foot state of the art facility. CWG/Watch Water has made a multi-million dollar commitment to support these new facilities with the latest technologies and the most advanced research available and will continue to increase manufacturing to ensure the utmost quality and supply control.



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Made from

## FILTERSORB SP3

Is a process used in water treatment to make a chemical reaction in water with **NANO dosage** of calcium Hydroxide.



Calciumbicarbonate  
**soluble** in water

Calciumcarbonate  
**NON soluble** in water

## What is Hardness?

- Hardness of water is a measure of its capacity to precipitate soap and is caused by the presence of divalent cations of calcium ( $\text{Ca}^{+2}$ ) and magnesium ( $\text{Mg}^{+2}$ ). Other multivalent cations also cause water hardness such as  $\text{Fe}^{+3}$ ,  $\text{Sr}^{+2}$ ,  $\text{Zn}^{+2}$ ,  $\text{Mn}^{+2}$ .

## How does Water become hard?

- Water becomes hard by being in contact with soluble, divalent, metallic cations (positive ions having a valence of 2). The two main cations that cause water hardness are calcium (Ca) and magnesium (Mg). Calcium is dissolved in water as it passes over and limestone deposits.

Magnesium is dissolved as water passes over and through dolomite and other magnesium bearing formations. Because groundwater is in contact with these geologic formations for a longer period of time than surface water, groundwater is usually harder than surface water.

Although strontium, aluminum, barium, iron, manganese, and zinc also cause hardness in water, they are not usually present in large enough concentrations to contribute significantly to total hardness.



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## Chemistry of Filtersorb SP3

- **FILTERSORB SP3** 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 **FILTERSORB SP3**. 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 **FILTERSORB SP3** 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 FILTERSORB SP3 is in service it is free to react with and remove carbonate hardness from the water. Calcium compounds react with SP3 in the reaction shown below.

Calcium bicarbonate + FILTERSORB SP3  $\leftrightarrow$  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 SP3 and produces calcium carbonate (which precipitates out of solution) and magnesium carbonate.

Magnesium bicarbonate + FILTERSORB SP3  $\leftrightarrow$  Calcium carbonate + Magnesium carbonate + Water Carbondioxide



- Then the magnesium carbonate reacts with SP3 and creates more calcium carbonate and magnesium hydroxide. Both of these compounds are able to precipitate out of water as nano crystals.

Magnesium carbonate + FILTERSORB SP3  $\leftrightarrow$  Calcium carbonate + Magnesium hydroxide





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## How is hardness expressed? (1/2)

- The grain per gallon is based on the old English system of weights and measures. It is based on the average weight of a dry kernel of grain (or wheat). The part per million is a weight to weight ratio. For example, one ppm of calcium means 1 pound of calcium in 1 million pounds of water, or 1 gram of calcium in 1 million grams of water. Since pure water weighs 1000 grams per liter, the mg/L is the same as the ppm in the dilute solutions present in most raw and treated water. To convert  
To Multiply by Grains per gallon Milligrams per liter 17.12  
Milligrams per liter Grains per gallon 0.05841

## How is hardness expressed? (2/2)

- Since calcium carbonate is one of the more common causes of hardness, total hardness is usually reported in terms of calcium carbonate concentration (mg/L as  $\text{CaCO}_3$ ), using either of two methods:
  - Calcium and magnesium hardness.
  - Carbonate and non-carbonate hardness.
  - Hardness caused by calcium is called calcium hardness, regardless of the salts associated with it. Likewise, hardness caused by magnesium is called magnesium hardness. Since calcium and magnesium are normally the only significant minerals that cause hardness, it is generally assumed that:

**Total Hardness = Calcium Hardness + Magnesium Hardness**

(mg/L as  $\text{CaCO}_3$ ) (mg/L as  $\text{CaCO}_3$ ) (mg/L as  $\text{CaCO}_3$ )

**= 2.50 X Calcium concentration + 4.12 X Magnesium concentration**

(mg/L as  $\text{Ca}^{2+}$ ) (mg/L as  $\text{Mg}^{2+}$ )

(b) Carbonate hardness is primarily caused by the carbonate and bicarbonate salts of calcium and magnesium. Non-carbonate hardness is a measure of calcium and magnesium salts other than carbonate and bicarbonate salts, such as calcium sulfate,  $\text{CaSO}_4$ , or magnesium chloride,  $\text{MgCl}_2$ . Total hardness is expressed as the sum of the carbonate hardness and non-carbonate hardness.

**Total hardness = Carbonate hardness + Non-carbonate hardness**

(mg/L as  $\text{CaCO}_3$ ) (mg/L as  $\text{CaCO}_3$ ) (mg/L as  $\text{CaCO}_3$ )

The amount of carbonate and non-carbonate hardness depends on the alkalinity of the water.

- When a laboratory reports a value for total hardness of, for instance, 150 mg/l as  $\text{CaCO}_3$ , this indicates that the combined effect of the different hardness causing agents is the same as if the water contained exactly 150 mg/l of  $\text{CaCO}_3$ .



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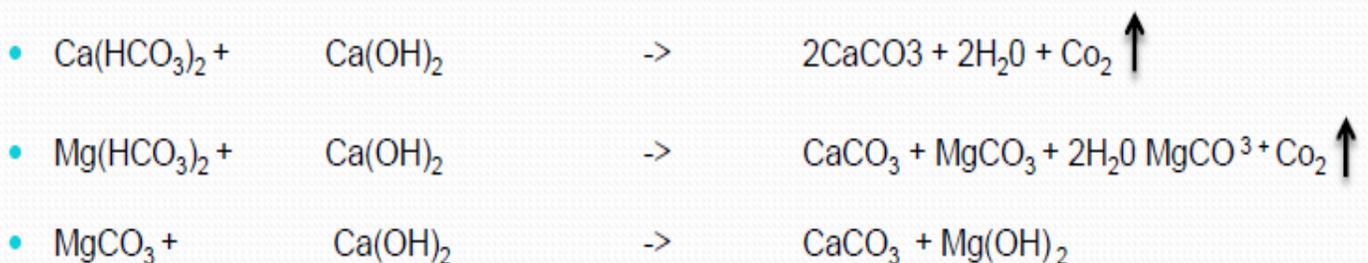
## FILTERSORB SP3

- Chemical precipitation is one of the most common methods to make NANO crystals. The chemicals normally used is calcium hydroxide. SP3 is used to remove the chemicals that cause the carbonate hardness.
- When SP3 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 ( $\text{CaCO}_3$ ). When magnesium hardness is removed in a chemical softener, it is precipitated as magnesium hydroxide ( $\text{Mg}(\text{OH})_2$ ). 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  $\text{CaCO}_3$ ).

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

## FILTERSORB SP3

- **Hardness Softening species chemical Precipitate**



- $\text{CO}_2$  = carbon dioxide,  $\text{Ca}(\text{OH})_2$  = calcium hydroxide or hydrated lime,  $\text{CaCO}_3$  = calcium carbonate,  $\text{Ca}(\text{HCO}_3)_2$  = calcium bicarbonate,  $\text{Mg}(\text{HCO}_3)_2$  = magnesium bicarbonate,  $\text{MgCO}_3$  = magnesium carbonate,  $\text{Mg}(\text{OH})_2$  = magnesium hydroxide,  $\text{MgSO}_4$  = magnesium sulfate,  $\text{CaSO}_4$  = calcium sulfate,  $\text{H}_2\text{O}$  - water.



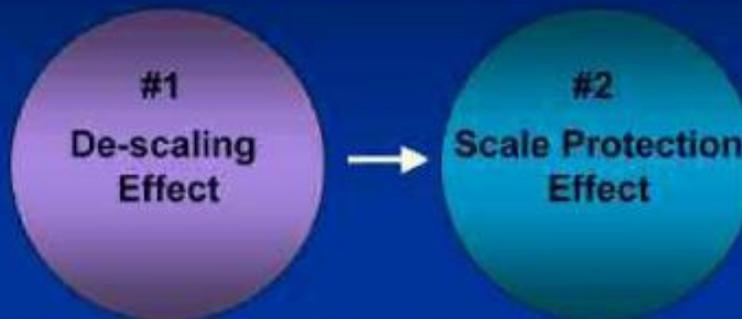
# Watch Water USA

## Filtersorb SP3 & Scale Prevention



The Environmental Water Conditioning Process

## Filtersorb SP3: The Anti-Scale Media



CWG Filtersorb SP3 Anti-Scale Media was especially developed and manufactured to first remove already existing scale from pipes and heat exchange surfaces (de-scaling effect) and secondly to protect from future formation of scale (scale protection effect) on the existing pipes and heating exchange surfaces.



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## Filtersorb SP3: The Manufacturing



Manufactured in a clean room environment under NSF regulations, the Filtersorb SP3 media has a precise automated and controlled manufacturing cycle which goes through multiple automated manufacturing processes.

## The Filtersorb SP3: Environmental



### The "Green" Water Conditioning Process

- Does not release harmful minerals or chemicals into the water system
- Does not waste excessive amounts of water
- Reduces Energy Consumption
- Preserves beneficial minerals



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## The Filtersorb SP3 Advantages



- Complete scale removal and prevention in all pipes and heat exchangers
- 100% removal of old calcium deposits
- Forms corrosion prevention by forming a 3 to 5 sub micron protection layer

## The Filtersorb SP3 De-scaling Process



**Phase 1:** Filtersorb SP3 catalytic media accelerates the transformation of the calcium and magnesium minerals out of the water solution into harmless "Nano" sized Crystal particles.

**Phase 2:** As the calcium crystals flow through the piping systems and equipment, the nano structure of the crystals dissolve additional calcium removing any preexisting calcium deposits.

**Phase 3:** After the old calcium deposits are removed the Filtersorb SP3 forms a smooth 3 to 5 micron thick corrosion prevention layer on existing pipes and equipment.



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## The Filtersorb SP3 Field Example

Washing Chamber of a Large Air-Conditioning System

Calcium deposits before installtion of a Filtersorb SP3 System.



6 weeks later calcium deposits in the washing chamber were completely removed.



## The Filtersorb SP3 Benefits

- Enviromentally friendly
- Significant Reduction in Operating Cost
- Salt-Free
- Chemical Free
- Maintenance free
- No wasted water
- Reduces soap and chemical consumption by 10 to 30%
- No electricity
- Vitamins are preserved
- Eliminates existing scale
- NSF 61 Gold Standard Certification



# Watch Water USA

## Residential Applications



- Drinking Water
- Home Appliances
- Laundry Machines
- RO Membranes
- Swamp Coolers
- Boiler, Water Heater
- Dish Washers
- Ice Makers
- Coffee makers
- Air conditioners

## Commercial Applications



- Pre-treatment for RO Systems
- Light/Heavy Manufacturing
- Breweries
- Processing Plants
- Restaurants
- Hospital/Medical
- Hotels, Cruise lines
- Car/Truck/Bus wash
- All Hardware
- Commercial Dishwashers
- Commercial Washing Machines
- Commercial Ice Makers
- Cooling Towers
- Evaporative Condensers
- Commercial Coffee Machines
- Pipes
- Laundry industry
- Steam Presses