The Nightmare of having Pure Water and a Safe Drinking Water Pipe System

Unfortunately not all water treatment processes adopt Vortexed Supercement metal pipe coatings sealing pipes with a 0,3mm layer of Supercement inside out.

A - Very few like us, **vacuum distill** your water to remove salts and poisonous chemicals (Fungicides, Herbicides, Hormones, Pharmaceuticals, Phytopharma-ceuticals, Psychopharmacas).

B - Practically no one **sterilizes** your water taken from a lake, river or well, as we do, via a solar µCat-HTR water-cracking unit shredding „poisonous“ thanks to the water and the sun’s radiation on TiO_2, to CO_2 a chemically inactive condition.

(Pls consult our 2 documents Vortexed Supercement and Making unlimited amounts of Soft Potable Water)

Soft waters with low buffering
A special case exists when the water source is high-purity groundwater or vacuum distiller water with little natural buffering. Buffering is the ability of water to resist pH changes when acids or bases are added to it. Low natural buffering is typical for water distiller waters AND not typical for community water systems. In our case, we add natural Dolomia (Calcium Magnesium Carbonate ($MgCa(CO_3)_2$), as filtering powder allowing us to balance water and its wonderful taste at your will in concentration from 25 up to 50mg/L of Calcium and Magnesium Carbonate. We strongly suggest using our steel pipes coated with Vortexed Supercement.

Causes of corrosion in water system pipes
Pipes used to distribute drinking water are made of concrete, stoneware, metal (e.g., steel, galvanized steel, ductile iron, copper, or aluminum) or plastic. Only non electrically conductive Vortexed Supercement coated steel pipes or old tech fragile stoneware pipes or even older but conductive concrete, cracks free pipes tend to be safe, resistant to corrosion, inert to water, not significantly causing calcium-carbonate scale precipitate. Plastic pipes tend over time to be leaking the plasticizer. Metal pipe corrosion is a continuous and variable process of ion release from the pipe into the water. Under certain environmental conditions, metal pipes can become corroded based on the properties of the pipe, the soil surrounding the pipe, the water properties, and stray electric currents. When metal pipe corrosion occurs, it is a result of the electrochemical electron exchange resulting from the differential galvanic properties between impurities in metals making up the pipes or parts thereof, or of the metal-parts being part of the pipeline, or the ionic influences of solutions, or aquatic buffering, or the solution pH.

For corrosion of metal water pipes to occur, an electrochemical cell must be present. An electrochemical cell can be thought of as a battery, with an electric current between a positive potential (anode) and a negative potential (cathode). The corrosive electrical potential is typically created by differences in the types of chemicals in the soil or on the surface of the metal pipe. However, if the pipe is sealed in nonconductive Vortex Supercement there is no ground of attack inside out and vice-versa.

Galvanic properties between dissimilar metals

All metals have slightly different properties, and galvanic differences are the tendency of one metal to release electrons to another metal. The galvanic series of metals is the hierarchy of which metals will release their electrons to other metals. Metals lower in the galvanic series more negatively charged will sacrifice their electrons to metals higher in the series. An example that many people are familiar with is zinc galvanizing of steel, where the zinc surface coating protects the steel from rusting. The galvanic interaction of different metals has a significant role in pipe corrosion because many commercial metals are alloys of various metals. Therefore, the various metal impurities on the interior or exterior surfaces of the pipe can provide locations for an electrochemical cell that can start the process of pipe corrosion. You could say, let us go hyper pure on metal. This is not an economically viable option since you just need to insulate the metal from ground and water, adopting a 0,3mm thick layer of our Vortexed Supercement, who is sticking 2,79N/mm2 to the blank steel surface. Vortexed Supercement is not allowing pipe calcium-carbonate scale, (the deposits on the inside of pipes) to stick on its surfaces at all.

Influence of ionic impurities on corrosion upon metal pipes

Water processors add chemical additives to water during the water treatment process. More than 40 chemical additives can be used to treat drinking water. Many of these commonly used additives are acidic, such as ferric chloride and aluminum sulfate, which are added to remove turbidity and other particulate matter. Various chlorine disinfectants also act as acids and have the potential to reduce pH, alkalinity, and buffer intensity. These acidic water treatment additives can activate corrosion. The amounts of each of these other additives used in water treatment typically vary from operator to operator ranging from 5 to 10 times the amount added to drinking water; therefore, their potential effect on the factors affecting water corrosivity is proportionately greater.

Most of these interactions will result in a precipitate where bacterias will nest, while incorporated into pipe scale (the calcite deposits on the inside of pipes, whereby apatite is formed in particular cases only) or removed by routine system flushing.

Water properties influencing corrosion

When waters are naturally corrosive, many substances have a tendency to dissolve in water. Many water quality factors affect corrosion of pipes used in water distribution, including the chemistry and characteristics of the water (e.g., pH, alkalinity, biology),

salts and chemicals that are dissolved in the water, and the physical properties of the water (temperature, gases, solid particles).
For example, the tendency of osmosis water to be corrosive is controlled principally by monitoring or adjusting the pH, buffer intensity, alkalinity, and concentrations of calcium, magnesium, phosphates, and silicates in the water. Actions by a water system to address these factors can lead to reduced corrosion by reducing the potential for the metal surface to be under the influence of electrochemical potential.
Waters differ in their resistance to changes in their chemistry. All waters contain divalent metals such as calcium and magnesium that cause water to have properties characterized as hardness and softness. If water is “hard,” it is less likely to “leach” metals from plumbing pipes but often leaves a deposit on the inside of the pipe. If water is “soft” it has less of a tendency to leave deposits on the inside of plumbing pipes but it leaches more metals from plumbing. If water is soft, then it has low hardness. Some people in communities with hard water will use water softeners, which will scare the hell out of your cardiologist. Water systems adjust the hardness and softness of water because of these tendencies and also for taste considerations.

Alkalinity is a characteristic of water-related to hardness. Waters with low hardness, or alkalinity (less than 50 mg/L as calcium carbonate), are more susceptible to the factors affecting corrosion; such systems will typically use additives that can prevent corrosion (corrosion inhibitors) to comply with regulations.

Corrosion inhibitors
Chemical additives are commonly used by the water treatment industry, for corrosion control. These include phosphates, silicates, and those affecting the carbonate system equilibrium (amount of carbonate in the system), such as calcium hydroxide, sodium hydroxide, sodium bicarbonate, and sodium carbonate. Corrosion inhibitors are commonly used to address the corrosion influence of acidic water treatment additives. The most common forms of fluoride for approximately 92% of the drinking water that is fluoridated are fluorosilicates, as either fluorosilicic acid or sodium fluorosilicate. Using fluorosilicates to fluoridate drinking water, adds a corrosion inhibitor „silica“ to the water and increases the silicates available for stabilizing the pipe surface, which contributes to reduced corrosion. Many divalent metals or heavy metal substances that have an ionic association with fluoride have poor solubility. These include calcium and magnesium cations, as well as many of the heavy metal ions such as nickel and lead.

Lead and copper in drinking water
Lead and copper are rarely detected in most drinking water supplies. However, these two metals are a concern to consumers. Because some household plumbing fixtures may contain lead or copper, corrosive waters may leach (pick up) lead and copper from household plumbing pipes after entering a home. Against belief, copper pipes are not immune to precipitate being incorporated into pipe as calcium-carbonate scale. This is a greater issue for older houses than for newer houses. The most common reason for water utilities to add corrosion inhibitors is to avoid lead and copper corrosion with older

homes, and the second most common reason is to minimize corrosion of pipes in the distribution system.

Partial source:
Division of Oral Health

Water Stress:
https://www.wri.org/blog/2019/08/17-countries-home-one-quarter-world-population-face-extremely-high-water-stress

Microplastics in drinking-water:
https://apps.who.int/iris/bitstream/handle/10665/326499/9789241516198-eng.pdf?ua=1

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