

# PASSIVATION TECHNOLOGY

# CORRTRAPP

## CORROSION

## INHIBITOR

### Passivation

**CORRTRAPP** products are non-hazardous environmental-friendly, safe and cost-effective treatment options for **Alkalinity addition** and pH adjustment without using phosphates for **drinking water** treatment pipes and equipment. Environmental regulations have become increasingly severe regarding the types and amount of pollutants that may be released into the environment. In particular, phosphates are commonly restricted. Often phosphates dosing is not completely successful in reducing **metal corrosion** in the drinking water pipes and equipment (like heaters). The **adsorbent** used to avoid corrosion is a **Novel Magnesium** based adsorbent from **Watch Water<sup>®</sup> Mannheim**, that has been used to avoid any corrosion and simultaneously neutralizing acidic components from water to stop all corrosion process.

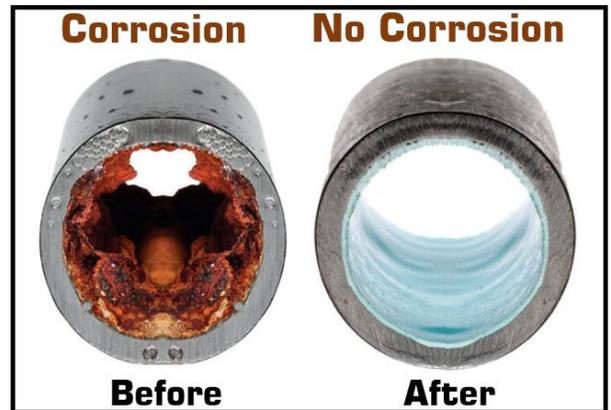
### Mechanism



M\* is shown as **Metal Surface** include Lead, Copper, Nickel, Iron and Zinc.

### Factors Influencing Corrosion

Factor	Effect
pH	<ul style="list-style-type: none"> <li>Low pH increase Corrosion.</li> <li>High pH protects Corrosion.</li> </ul>
Chloride and Sulfate	High levels increases Corrosion in Iron, Lead and Copper pipes.
Water Softeners	High sodium levels increases metal corrosion
TDS	High conductivity increases corrosion
Alkalinity	Only high alkalinity controls pH and help to form protective coating and passivation



**CORRTRAPP**

**Oxidation**

Fe  $\longrightarrow$  Fe<sup>2+</sup> + 2e<sup>-</sup>

Pb  $\longrightarrow$  Pb<sup>2+</sup> + 2e<sup>-</sup>

Cu  $\longrightarrow$  Cu<sup>2+</sup> + 2e<sup>-</sup>

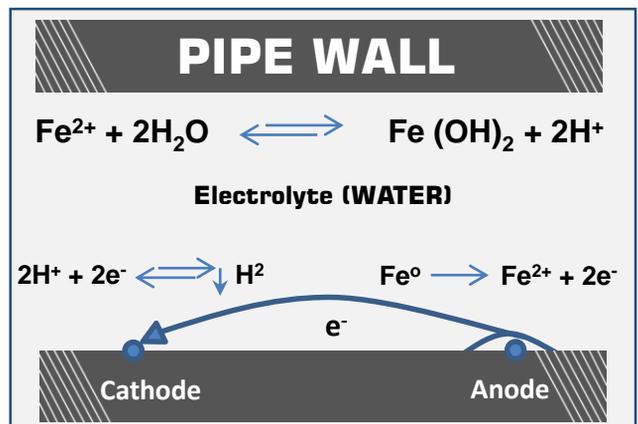
Cation's (Least Active)  $\longrightarrow$  Anions (Most Active)

**Reduction**

2H<sub>2</sub>O + 2e<sup>-</sup>  $\longrightarrow$  H<sub>2</sub> + 2OH<sup>-</sup>

**Passivation**

2MgO + 2e<sup>-</sup>  $\longrightarrow$  Mg + 2OH<sup>-</sup>





# CORROSION STABILIZATION

- **Never use Phosphates**
- **Phosphates increases**
  1. **Bacterial Growth**
  2. **Legionellae Water**
  3. **Forms calcium phosphate scale**

**Calcium Phosphate passivation rarely adheres to Lead and Copper Pipe walls and are not considered as an effective form of corrosion control.**

## PIPE CORROSION

**Iron, Lead, Zinc and Copper** corrosion are one of the most complicated and costly problems facing drinking water utilities. A large number of parameters affect pipe corrosion, including water quality and composition, flow conditions, biological activity and cheap corrosion inhibitors. **CORRTRAPP** synthesizes nearly 100 years of corrosion studies and now available to water treatment industry. **Watch Water**<sup>®</sup> estimates that it will cost worldwide Municipalities and utilities \$850 billions over the next 20 years to update and passivate water distributions systems. The majority of distribution system pipes are composed of **Lead, Copper, Iron and Zinc pipes.**



## pH Control Cost

**CORRTRAPP** offers unparalleled pH control. The buffering characteristic of



does not raise drinking water pH above 9.5- the upper control limit mandated by German TVO-Drinking Water Regulation. This eliminates the cost of the **Phosphates** and **Sodium Hydroxide** required to reach this pH to keep high buffering capacity and corrosion control.

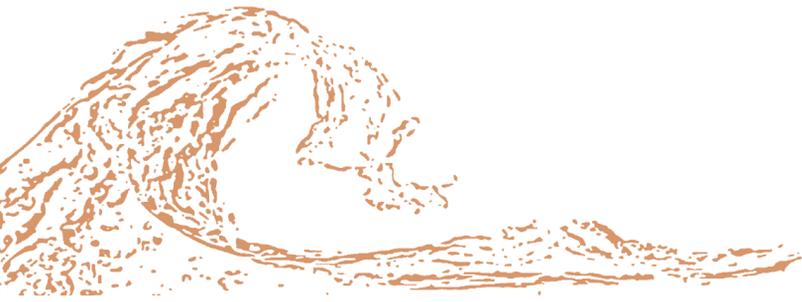
**CORRTRAPP** is a bead, Magnesium-based adsorbent which has been used to passivate various metals. The metals treated with **CORRTRAPP** include **Lead, Copper, Nickel, Iron and Zinc.**

## BENEFITS

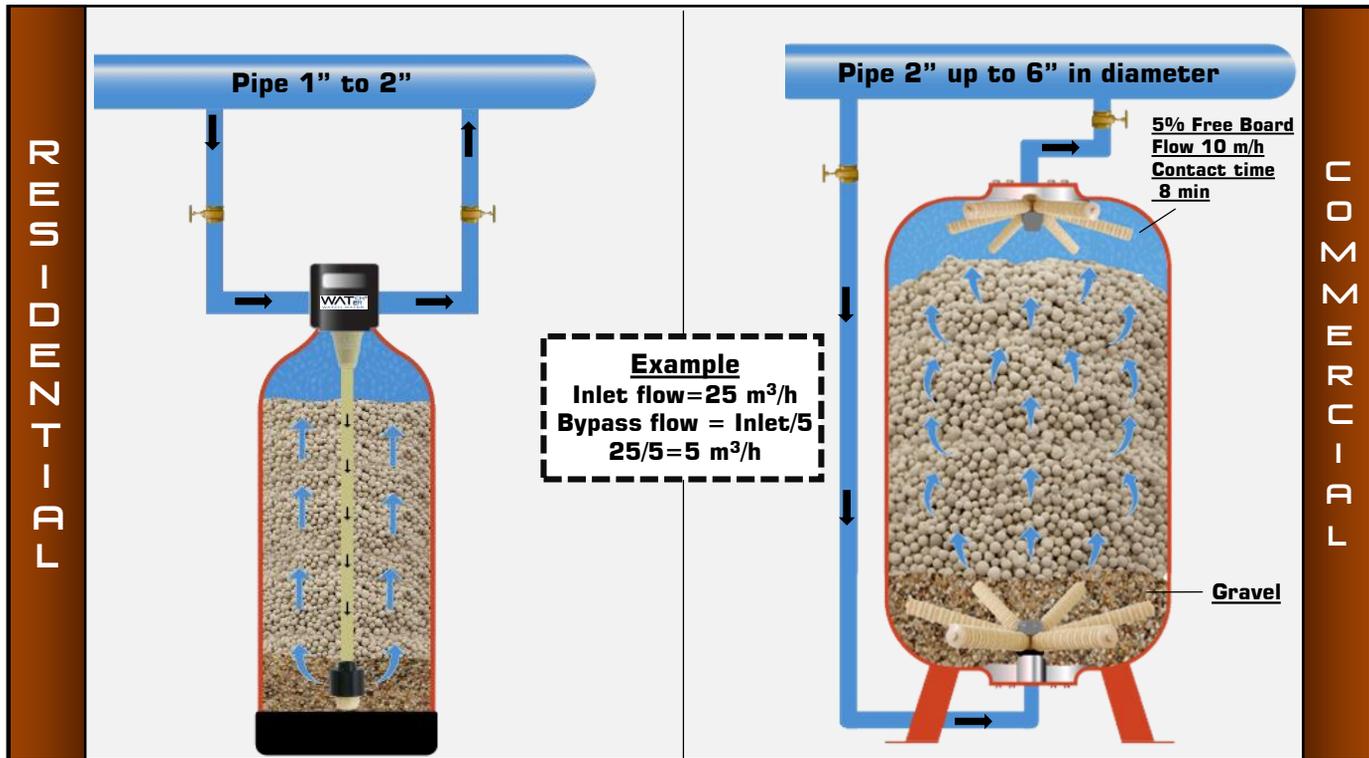
Benefits	Corrtrapp	Phosphates
Does not Cause Scaling Problems	✓	✗
Supplies more MgOH alkalinity	✓	✗
Long lasting Alkalinity/Passivation	✓	✗
pH Control	✓	✗
Provides Healthy Magnesium	✓	✗
Safe for the environment	✓	✗
Non- Toxic for the environment	✓	✗
<b>No Need to Use NaOH</b>	✓	Danger

### Applications

- **Municipal Water Processing**
- **POU and POE**
- **All Healthy System's**
- **All Boilers (Hot Water Systems)**
- **Cooling Water System's**
- **Refinery Unit & Lubricants**
- **Gas Pipelines**
- **Oil & Gas production**
- **Food & Beverage Industry**
- **Acid Mine Industries**
- **Paint and Pigments**
- **Aggressive and Acidified Well's**



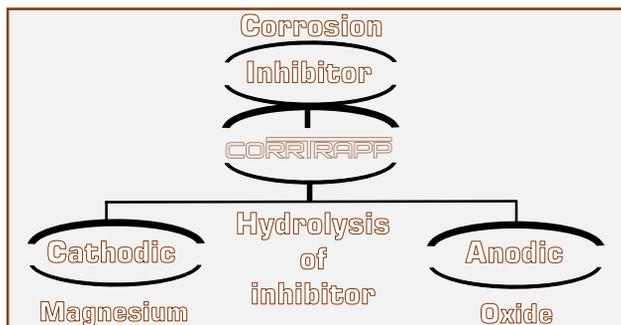
# GET THE CORROSION OUT WITH - UP FLOW CORRTRAPP TOWERS ONE IN AND ONE OUT



## FEATURES OF CORRTRAPP TOWERS

Phosphates free up-flow corrosion inhibitor – Eliminate corrosion of metallic pipes **Lead, Copper, Iron** and **Zinc** by adding Alkalinity into the water

- Raising pH.
- Neutralizing all acids like **CO<sub>2</sub>** and **Hydrogen Sulfide**.
- Adding Magnesium to make the water taste Great, Healthy and eliminate bottle water use.
- Multiple **CORRTRAPP Towers** can be used for maximum flows.
- Up-flow design doesn't require water for back washing.
- Up-flow design doesn't require electric Valves.
- As the corrosion and passivation media dissolves into the water increase (raises Alkalinity) buffer capacity, it will need to be replenished from time to time.
- Using **Fiberglass** pressure vessels is more suitable as they do not **Rust** and **Corrode**.
- **Top Mount** tanks sizes 10" up to 21" and **top opening** 2.5" or 4".
- **Flange Tanks** are 6" top and 6" bottom opening with 0.5mm star distributors. Tank sizes 16" inch diameter up to 63" diameter can be ordered from **Watch Water<sup>®</sup> Mannheim**.



**Anodic part of CORRTRAPP** (Called corrosion and Passivation inhibitor) act by **Reducing** anodic reaction, that blocks the **Anode Reaction** and supports the natural reaction of passivation metal surface also due to the forming of film adsorbed on the metal. The inhibitor reacts with the corrosion product, initially formed, resulting in a cohesive and insoluble film on the metal surface.

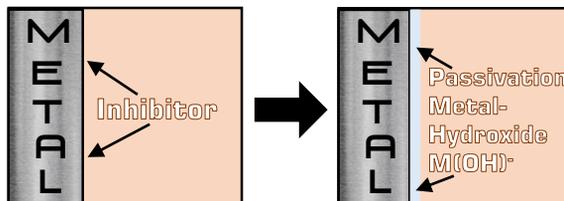


The anodic inhibitor reacts with the metallic ions  $Me^{+}$  produced on the anode, forming insoluble hydroxides ( $OH^{-}$ ) which are deposited on the metal surface as insoluble film and impermeable to metallic ion. From the **Hydrolysis** of **CORRTRAPP** results in  $OH^{-}$  ions Figure above shows how is the mechanism of the **CORRTRAPP** and the anodic inhibitory effect. When the concentration of hydroxides (Anodic inhibitor) becomes high enough, the cathodic current density at the primary Passivation potential becomes higher than the critical Anodic current density, that shift the potential for the noble sense and consequently the metal is passivated.

For the **anodic inhibitor effect**, it is very important that the pH concentration should be high enough in the solution. The inappropriate amount of the inhibitor affects for the formation of film protection, because it will not cover the metal completely, leaving sites of metal exposed and thus causing a localized corrosion.

Concentrations below **pH-8**, these values are worse than without **CORRTRAPP** at all. pH value less than 8 can cause pitting, due **Reduction** at the **Anodic** area relative to **Cathodic** or can accelerate corrosion, like generalized corrosion, due to full break down the passivity.

Some Toxic Anodic Inorganic inhibitors are **Molybdates, Chromates, Phosphates** and **Phosphonates**. These inhibitors should not be used in drinking water systems.



## Cathodic Inhibitor

Magnesium is a cathodic inhibitor in **CORRTRAPP** technology. It reacts with Hydroxyl ( $OH^{-}$ ) of the water forming the insoluble hydroxides as  $Mg(OH)^2$  which is deposited on the Cathodic site of the metal surfaces and protect them from corrosion. Polyphosphates, Phosphonates, Tannins, Lignin's and calcium inhibitors cannot undergo the same mechanism like **CORRTRAPP**.

**CORRTRAPP** minimize the release of Hydrogen ions and change its structure to **Hydroxide** ions and stops over voltage. **CORRTRAPP** contain oxygen when adsorbed on the metallic surface blocking the active corrosion. The most effective and efficient inhibitors are compounds that have Magnesium Ion's. **CORRTRAPP** is the only inhibitor without any Biological toxicity or environmental harmful characteristics. **Toxic inhibitors** are Amines, Benzotriazole, Tolyltriazole, Aldehydes and also Ascorbic acid. These mentioned inhibitors should never be used **Drinking Water Systems**.

## Best Corrosion Inhibitor

**CORRTRAPP** is a great method of Preventing Corrosion and are easy to apply through **CORRTRAPP towers** and has wide range of applications in different water treatment sector. All facilities around the world has a choice to prevent pipes, heating systems, Cooling towers to use **CORRTRAPP** with its high efficiency, avoids damages and have healthy water. The search for environmental friendly corrosion inhibitor is now **CORRTRAPP** which has shown excellent results, outperforming conventional inhibitors.

**NOTE:** Maintenance of system during stagnant period of time, backwash is recommended at least once a week.