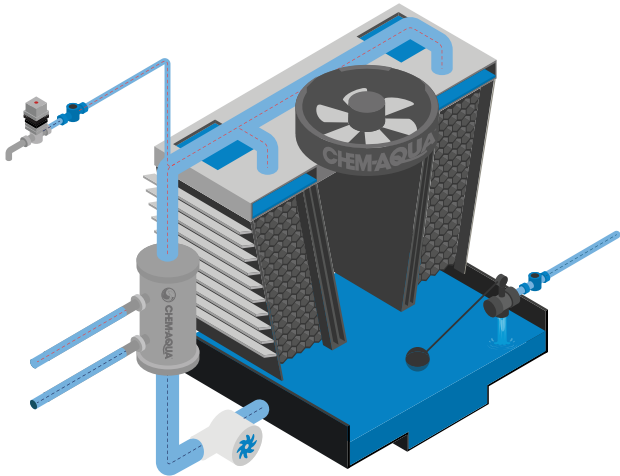


MINIMIZING WHITE RUST IN COOLING SYSTEMS

White rust is a complex problem that can have a negative impact on water systems made of galvanized steel components with continuously or intermittently wetted surfaces.



WHAT IS GALVANIZED STEEL?

Galvanized steel is formed by bonding a layer of zinc to steel. The zinc coating on new galvanized steel is shiny. New galvanized steel must be passivated to form a protective oxide layer for maximum protection of the underlying steel. Passivated galvanized steel has a dull gray appearance.



New Galvanized Steel

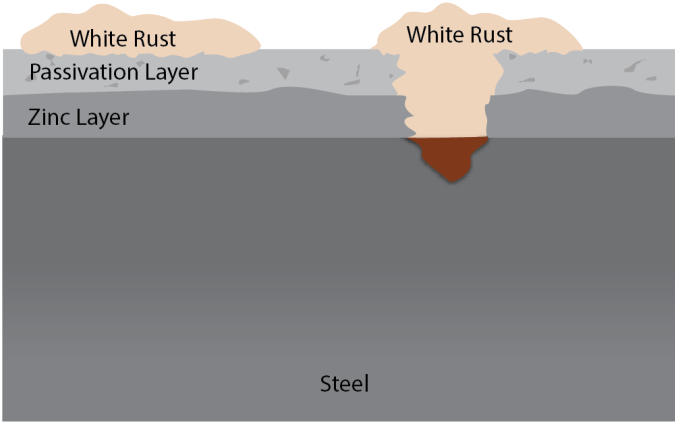


Passivated Galvanized Steel



WHAT IS WHITE RUST?

White rust is a porous deposit that can develop on galvanized steel exposed to water. It can form when the proper water conditions are not maintained to support the formation of a protective oxide layer. New galvanized metallurgy is susceptible to white rust. Once white rust has started, it can be difficult to control.



IMPACT OF WHITE RUST

White rust reduces the corrosion protection the zinc coating provides to the underlying steel. This can reduce the lifespan of galvanized cooling towers, evaporative condensers, fluid coolers, and heat exchange coils.

FACTORS THAT CONTRIBUTE TO WHITE RUST

Startup

- New systems started without a water treatment program and passivation plan in place
- Damaged galvanized coating
- Dirt and other debris shielding galvanized surfaces

Water Chemistry

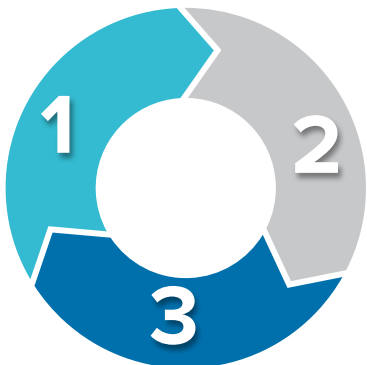
- High alkalinity / pH levels
- Low hardness levels
- High sulfate / chloride levels
- High chlorine / bromine levels
- Changing makeup water quality

Operational

- No on-site monitoring
- Problems between service visits cause water chemistry to fluctuate outside passivation control ranges
- Failure to re-passivate when upsets occur

PREVENTION IS COMPLEX

The best way to prevent white rust is to not use galvanized metallurgy. It is very important to passivate any newly galvanized cooling tower before and during startup. At a minimum, passivation water chemistry must be strictly maintained for the initial 8 - 12 weeks of operation. Maintaining good pH control during passivation is the most critical factor. Re-passivation may be necessary following pH/oxidizer excursions, disinfections, and when white rust becomes visible.



OWNER RESPONSIBILITIES

1. Collaborating with a trusted water treatment provider during equipment selection, startup, passivation, and ongoing operation is key
2. Monitoring the water chemistry daily to maintain within the recommended guidelines
3. Scheduling routine system inspections

Due to variations in makeup water quality and impact of operating conditions beyond the control of the water treatment program, white rust can be difficult to prevent, but steps can be taken to minimize it. If you wish to learn more about your existing, future, or about-to-be commissioned galvanized cooling tower, contact Chem-Aqua today!