

About Your Galvanized Steel Cooling Tower

Your new cooling tower or fluid cooler is constructed of sheet steel casing and structural components protected with "heavy mill galvanizing" (HMG). This protective zinc coating is fused to the sheet steel at the steel mill in a continuous hot-dip process. The zinc coating in Marley® towers conforms to the industry standard coating class G-235, which means the weight of zinc coating averages 2.35 ounces per square foot of steel sheet. All of the HMG steel sheet used in our towers is treated after galvanizing with a chromium-based solution to initially passivate the zinc coating. This important step helps prevent the formation of "white rust" (aka "wet storage stain") on the surface of galvanized steel sheet during storage, fabrication, and transportation.

Neutral pH Water Treatment at Tower Start-Up Necessary

HMG steel provides excellent corrosion resistance in cooling towers and many other applications exposed to natural outdoor environments. Zinc protects the base steel sheet by galvanic action. **To get the best life from your galvanized tower, proper water treatment is required.** Initially, the zinc coating must be allowed to develop a natural nonporous surface of "basic zinc carbonate." This natural chemical barrier prevents further rapid corrosion of the zinc coating from the environment as well as normal cooling tower operation. **The basic zinc carbonate barrier will form on galvanized surfaces within eight weeks of tower operation with water of neutral pH (6.5 - 8.0), calcium hardness of 100 - 300 ppm (as CaCO₃), and alkalinity of 100 - 300 ppm (as CaCO₃).** It is very important for the protective basic zinc carbonate barrier to form on galvanized tower surfaces to resist further corrosion. The initial operation of your cooling tower will *significantly* affect its service life.

What is "White Rust" – Can it Harm My Cooling Tower?

Based on our experience, a very small percentage of galvanized towers incur a damaging type of corrosion which is commonly called "*white rust*." White rust appears as a white, waxy

or fluffy adherent deposit on surfaces. If it occurs unchecked, the galvanized steel coating will continue to corrode, eventually leading to an early failure of the galvanization in your cooling tower. White rust is actually another form of zinc carbonate which has a different porous structure from the protective "basic zinc carbonate barrier" that naturally protects galvanized surfaces. **White rust can form if your new cooling tower is operated with water of pH greater than 8.0 for an extended time period before the basic zinc carbonate barrier can form.** There is also evidence that some types of film-forming inhibitor water treatments can promote the formation of white rust if used excessively. If start-up water treatment of the cooling system does not allow for initial passivation of your tower's galvanized surfaces, you may face expensive corrective repairs and water treatment to cure the resulting white rust.

Why is a Knowledgeable Water Treater Important for My Cooling Tower?

The best cure for white rust is an ounce of prevention when you begin operating your tower. Natural passivation can be achieved by initially operating your cooling tower with water having a pH between 6.5 and 8.0, and calcium hardness and alkalinity values between 100 - 300 ppm for at least 8 weeks. An alternative to natural passivation is specialized chemical treatment. Many water treaters offer corrosion inhibitors specifically for galvanized steel. These inhibitors form a protective film, which must be maintained with a consistent inhibitor residual in the circulating water. **In the event emergency operations are required and it is not possible to wait during the passivation period, chemical corrosion inhibitors are recommended on cooling towers or evaporative condensers until natural passivation can occur.** Consult with your water treatment provider and ask about his program for initial system operation and passivation of your galvanized steel cooling tower. Be certain your water treatment company is recommending a program suitable for your galvanized steel cooling tower before start-up!

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