

Cooling Tower Water Treatment Overview

Primary Objectives of Cooling Water Treatment

- Maintain the operating efficiency of the cooling water system.
- Protect the equipment that contacts the cooling water.

Cooling Tower Chemical Treatment Controls

1. **Scale Deposits Control:** Scale is formed from minerals dissolved in water. As water is evaporated from the cooling tower, scale is formed on any surface in contact with the water, especially heat transfer surfaces. Deposits interfere with heat transfer and reduce efficiency. Deposits can also promote under-deposit corrosion.

Scaling Deposits Prevention: Chemical treatments help control mineral scaling. The most common method used to prevent the formation of scale in cooling water systems is to add chemicals designed to keep the scale-forming ingredients in solution. The other method is to add chemicals designed to modify the scale-forming ingredients so they cannot adhere to each other to make a hard deposit. Instead, they become sludge that can be removed through filtration or blow down.

2. **Corrosion Control:** Proper chemical treatment prevents corrosion, which can damage equipment and shorten the lifespan of the cooling water system. Corrosion in a cooling water system is defined as the electrochemical deterioration of a metal that is in contact with the cooling water.

Corrosion Prevention: To prevent corrosion, water pH levels are controlled, and chemical corrosion inhibitors are added. In cooling water systems, corrosion rates decrease when the cooling water pH is increased, ideally within the range of 8.0 to 9.5. Chemical corrosion inhibitors are also added to form a protective film or barrier on the cooling system metal surfaces, which prevents the electrochemical reaction that causes corrosion.

3. **Biological Growth Control:** Cooling towers provide an ideal environment for microorganisms such as algae, bacteria, and fungi due to the presence of water, nutrients, and sunlight. Microorganisms form biofilms on wet surfaces, which can cause fouling, reduce heat transfer efficiency, and promote corrosion. To prevent their growth, biocides are added to the cooling water system.