



Technical Bulletin

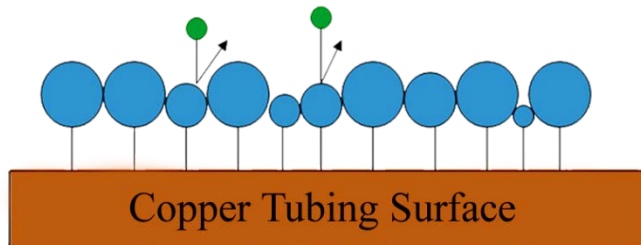
Importance of Azole for Water Treatment

One industry expert explains that most plant engineers would rather replace 100 feet of mild steel piping than one inch of copper. This is because that one inch of copper will be in the middle of your chiller.¹

Major issues can arise from the corrosion of copper chiller tubes. The repair or replacement costs for an improperly treated system can easily soar into the tens of thousands of dollars. A properly designed water treatment program for such systems will include azoles for copper corrosion protection.

Azoles are organic molecules that are used as corrosion inhibitors for copper and copper alloys including brass and bronze. Azoles are included in most cooling water treatment programs. Originally developed as a paint and coating additive over 60 years ago, azoles have become the industry standard for protecting copper in commercial and industrial water-using systems.

Azoles protect against copper corrosion by bonding with the copper and forming a protective film. The hydrophobic (water-repelling) portion of the molecule prevents corrosive elements, such as bromine, from oxidizing the metal surface. In the figure below, the blue represents the protective azole film that forms with copper.



Bromine is a common oxidizing microbicide used in many water treatment programs. Other oxidizing biocides include Chlorine, Chlorine Dioxide and Ozone. By adding oxidizing biocides, a High Corrosive Environment (HCE) can be created which further substantiates the need for azoles. Severe corrosion and eventual tube failure can occur if these corrosive elements are directly exposed to copper tubing.

Another concern related to copper corrosion is the galvanic corrosion that occurs when soluble copper ions plate out on mild steel surfaces. The copper is cathodic to the anodic mild steel site and the result is pitting of the mild steel surface. By maintaining low copper corrosion rates, galvanic corrosion is minimized. And as an added benefit, azoles will carry copper and prevent the plating effect on mild steel.

There are several ways to determine if proper azole levels are present in the water treatment program. Many Cooling Tower Scale and Corrosion inhibitors will contain 2 ppm azole at the dosage rate of the product. Confirming the use of azole by asking your water treater or reading the product literature or SDS is a good place to start.

Testing for azole levels can be performed using the Hach UV Digestion Kit or the Pyxis SP-395 Triazole Meter. Both are very accurate and should be discussed with your water treater. New to the industry, an online version of the meter is called the Pyxis ST-565 Azole Probe. This can be used with a standard control panel equipped with analog inputs for real-time azole detection.



Avoiding extra maintenance, costly repair and downtime is the one of the main goals of water treatment. An important means to this end is the use of azole in the cooling product. And obviously, the cooling product must be injected into the system in such a way that treatment levels are accurately maintained and monitored. This must be achieved by either direct online measurement or bleed-proportional feed. Manually slug feeding or using time-proportional methods cannot maintain consistent treatment levels. Proper application will minimize maintenance cost, repair and downtime, improve water conservation and deliver clean heat-transfer surfaces. This will ultimately provide your facility with a **Sustainable Water Treatment Program**.

¹ H₂OMEYER Consulting Services, Inc. Copper Protection: Understanding the Facts from Fiction

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