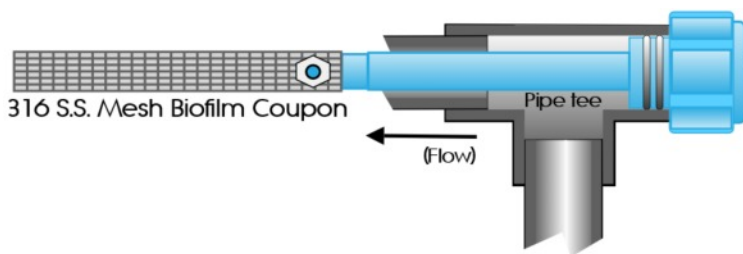


# Biofilm Detection Services

Bacteria populations in cooling systems are capable colonizing and producing a slime layer, or a “biofilm”, that reduces heat exchange and induces microbial induced corrosion. A common objective of cooling water management programs is to reduce or eliminate biofilms to maximize operating efficiency, deter the potential for localized corrosion resulting in pipe and equipment failure, and reduce the potential for replication of deleterious bacteria such as Legionella, the bacteria responsible for Legionnaires Disease.

Azure supplies and installs **Biofilm Monitoring Stations** on cooling towers and similar systems. We offer two levels for monitoring and detection - a **Basic** and **Advanced** level of service. The services are based on the procedures utilized in the Cooling Tower Institute white paper no: TP14-18

Incorporating a Biofilm Detection Service will provide assurance of the efficacy of the treatment and maintenance program as well as provide insight into internal system conditions such as general cleanliness. Monitoring and reporting a lack of sustainable biofilm may be an important part of an ASHRAE 188 compliance program for the reduction of Legionella associated operating risks.



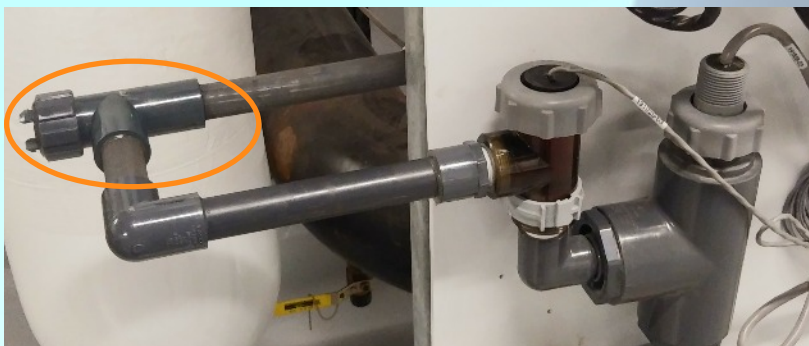
Azure can install a single Biofilm Monitoring Station to perform our Basic Service or utilize a coupon rack with at least 2-stations for Advanced Services.

## Basic monitoring

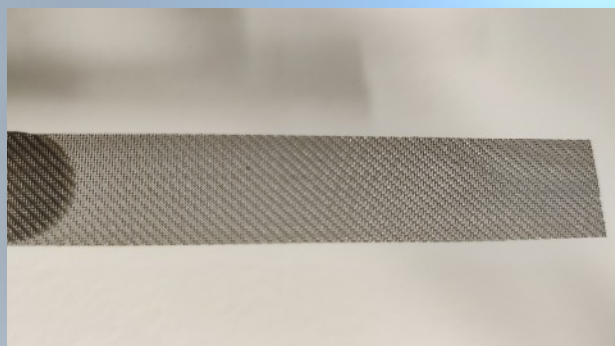
A single stainless steel mesh coupon is visually inspected and photographed during service visits. Mesh coupons, having a large surface area and small passages, present a substrate for bacteria attachment that represent the worst possible conditions in the cooling system. The inspection helps to ensure that the installed treatment system provides “no sustainable biofilm” in the system and support the need for maintenance actions such as cooling tower pan cleanings, for example.

## Advanced monitoring

A set of stainless-steel mesh and flat coupons are installed for a period of approximately 30-days before being placed in a special preservative solution for transport to a laboratory. After processing and applying a calculation, the bacteria count for each coupon is reported as the number of colony forming units per square centimeter (cfu/sq.cm). The flat steel coupon provides a test control and is likely more representative of the actual internal conditions of the system where the mesh coupon represents the probable worse-case scenario.



A single Monitoring Station (orange circle) installed downstream of a conductivity controller sensor assembly.



A mesh coupon removed for visual inspection and photographic documentation during a Basic service.