

# AQUARIUS

## Biofilm Legionella Trap

Simple and Inexpensive Device  
to allow for  
Biofilm Evaluation  
and Legionella presence  
on Cooling Water Systems



- √ Simple and easy device to install
- √ UV resistant, Corrosion resistant and Inexpensive
- √ Allows Biofilm to grow on glass beads,  
for laboratory evaluation
- √ NATA Microbiological Laboratory can determine
  - The biofilm thickness in microns
  - Presence of Protozoa or Amoebae
  - LDB count as cfu/cm<sup>2</sup> surface area
  - HPC count as cfu/cm<sup>2</sup> surface area

Model - BLT100



**Test for the presence of Legionella in its preferred habitat in the biofilm.  
Improve Heat Transfer efficiency with reduced biofilm growths.**

# Biofilm Legionella Trap

## Features and Benefits

The **Aquarius Biofilm Legionella Trap** has been designed as a low cost solution to allow easy access to cooling water biofilm growths, and to allow for a NATA microbiological laboratory report of both the quantity and thickness of biofilm, but also the microbiological population inhabiting the biofilm and in particular for Legionella bacteria.

It had long been established that it is biofilm growths which harbour legionella, - see Technical Bulletin No. 32. They also reduce heat transfer, so there is two fold benefit in eliminating biofilm growth with a carefully programmed biocide program.

The **Biofilm Legionella Trap** is installed in the vicinity of the cooling tower and a flow rate of 2 - 3 lts per minute of cooling water, taken from the pressure side of condenser pump, and allowed to circulate through the trap and return to the cooling system suction side or tower basin.

Biofilm growth will usually establish and grow a film on the glass beads within 7 - 10 days where the HPC counts are in excess of  $10^5$ . On systems with low HPC's, e.g.  $10^3$  and below, the unit should be allowed 30 days or more to establish a biofilm (or lack of biofilm) before presenting the trap to the NATA microbiology laboratory for full evaluation.

On cooling systems which have recently been introduced to ORP and continuous oxidising biocide treatment the **Biofilm Legionella Trap** should be allowed a minimum of 30 days exposure before Laboratory evaluation, to demonstrate the dramatic reduction in both quantity of biofilm and in the microbiological population.

## Specifications

### Biofilm Legionella Trap

Pressure Rating	=	500 kPa.
Temperature Rating	=	Max. 50 °C
Bead Diameter	=	3.0 mm.
Bead Surface Area	=	approx. 100 cm <sup>2</sup>
Flow Rate	=	2.0 - 3.0 lts/minute
Flow Velocity	=	0.25-0.37 metres/second.

## Suggested Technique

The following steps are suggested as a technique, but those skilled in the art will be able to modify these steps to obtain the end result, i.e. how much biofilm is present on the wetted surfaces of the cooling system? and what is the microbial population of the biofilm.?

1. Install the **Biofilm Legionella Trap** in the vicinity of the cooling tower, measure the flow rate and set flow at 2 - 3 lts/minute, 2.0 l/m equals a velocity of 0.25 m/sec and flow rates in excess of 3.0 l/m may be sufficient to agitate the glass beads sufficiently to dislodge some of the biofilm to be swept back in main system.

2. Allow the trap sufficient exposure time to form a biofilm representative of the system as a whole, e.g. where there has been a LDB positive, or HPC is  $10^5$  or greater, 7 -10 days exposure is likely to grow a biofilm in equilibrium with the system. On systems with low HPC of  $10^3$  or less at least 30 days exposure should be allowed.

3. After the exposure period the **Biofilm Legionella Trap** with glass beads and biofilm is taken to the laboratory in its entirety for evaluation.

4. The microbiological laboratory should allow the trap to drain in an upright position for about 30 minutes before unscrewing the end cap, and emptying the glass beads into a tared beaker and established the damp weight of the beads and biofilm.

5. A known amount of sterile liquid (50 - 100 mls) is added to the beads, and then sonicated to remove the biofilm and adhering bacteria. This known volume of sonicated liquid is used for bacterial estimations.

6. The glass beads are further washed in a strong "hypo" solution, rinsed, dried and reweighed.

7. The surface area of the glass beads is calculated from weight of clean dry beads multiplied by 0.9214 = cm<sup>2</sup> surface area

(b) the weight of biofilm is "damp beads and biofilm" minus "clean dry beads weight" in gms.

(c) the thickness of the biofilm in microns ( assuming the density is very close to 1.0) is as follows

**(Mass of biofilm in gms / surface area in cm<sup>2</sup>) x 10000 equals avg microns thickness of biofilm.**

8. Microscopic evaluation of the sonicated liquid should be carried out for protozoa, amoebae, worms, etc., and population and numbers reported.

9. A LDB should be carried out but reported as cfu/cm<sup>2</sup> of glass bead surface area as per step 7 above.

10. A HPC should be carried out and reported as cfu/cm<sup>2</sup> of glass bead surface area.

11. The clean glass beads are returned to the trap and the unit is ready for a further installation and exposure.