

ATP SCAN

A breakthrough in rapid microbiological analysis

What is ATPscan?

ATPscan is a technique that enables the instantaneous measurement of microbiological activity in water systems and services, which means that the 2-3 day delay associated with current methods of testing e.g. dip slides is eliminated.

So, what does that mean?

Two to three days is a long time in the life cycle of a micro-organism. If micro-organism levels were increasing and remained undetected during this period, damaging biofilms will have begun to form. This will reduce plant efficiency, lead to under-deposit corrosion and create conditions in which the potential for the growth of Legionella bacteria is increased, or in the case of surface bacteria, further air or contact contamination.

How does ATPscan work?

ATPscan uses proven technology that utilises the natural phenomena of bioluminescence to measure microbiological activity. This technique has been available since the 1970s but only now has it been made fully portable and cost effective. This means that **ATPscan** can now be widely and easily used as a routine monitoring tool.

The keys to the success of the **ATPscan** system are the sampling pen, which samples the water or swab fluid and adds the reagents in one simple procedure, and the compact, portable luminometer.

What is Bioluminescence?

All living cells contain a chemical called **ADENOSINE TRIPHOSPHATE**, which is used during metabolism and in energy production.

Certain organisms such as mollusks and insects contain enzymes that react with ATP to produce light.

ATPscan uses the enzyme reaction from one of these species, the firefly, to measure the amount of light produced by the ATP present in a sample containing micro-organisms. The amount of light produced is directly proportional to the number of micro-organisms in the sample (as one molecule of ATP emits one photon of light).

Summary of ATPscan ATP Technique

Step 1 – micro-organism + lysing agent = Free ATP. This is released into buffered solution.

Step 2 - Free ATP + enzyme reagents = the amount of light emitted which is measured in RLU's.

Does ATPscan measure Legionella bacteria?

ATPscan will give a measurement of the light produced by the ATP present in all types of micro-organism, including Legionella.

However, in most cases, even when Legionella bacteria are present in a water sample they are vastly outnumbered by other more common types of species: so in effect, the total microbiological status of the systems water is measured, including Legionella bacteria.

This is an important benefit of **ATPscan** over dip slides. **ATPscan** also responds to the presence of sulphate reducing bacteria and nitrogen cycle bacteria, whereas dip slides will not. What this means is that **ATPscan** will show all changes in the microbiological population of the system. This allows much improved control of health risks and operational problems associated with biofouling and surface contaminants.

Can I compare ATPscan readings to dip slide readings?

ATPscan will measure all types of micro-organism present in a water sample or surface sample whereas dip slides will only measure aerobic bacteria and yeast and fungi, if they are of the dual media type. So if your system only contained aerobic bacteria then you could correlate **ATPscan** readings to dip slide readings. However the chances that this is the case are extremely remote so the answer is no, you cannot directly compare **ATPscan** readings to dip slide readings.

How would different species of micro-organism affect ATPscan results compared to dip-slides?

ATPscan will show any changes in the level of all micro-organisms whereas dip-slides will only reflect any changes in the aerobic bacteria. Bioscan gives you a better indication of the status of the system and lets you know of any changes to the micro-organism population.

ATPscan should be used to regularly monitor a system and will given warning of any changes which indicate that the system is going out of control. This will allow corrective action to be taken, before a problem arises. You can be proactive with **ATPscan**, rather than reactive with dip slides.

ATPscan control limits

ATPscan gives a read out in Relative Light Units (RLU's), which are proportional to the level of all micro-organisms in a water sample.

Control limits are set to ensure that the microbiological status of the system can be easily interpreted by the operator.

RESULTS REPRESENT A **GUIDE** TO THE QUALITY OF THE WATER PRIOR TO USE.

ATPscan CONTROL LIMITS			
COOLING TOWERS		DOMESTIC WATER SYSTEMS	
Relative Light Units	Comment	Relative Light Units	Comment
<70	Excellent control	<50	Excellent
70 - 150	Good control	50 - 100	Fair
150-250	Alert situation	100 - 200	Alert situation, investigate, recommend bacterial testing.
>250	System out of control	>200	System out of control, investigate, carry out bacterial water testing.

ATPscan is it reliable and how many are in use?

ATPscan has been developed over many years and following extensive field trials has now been released on a global basis. Its reliability is proving to be good but does not replace normal monitoring with Laboratories The advantage with this system is instant early warning.

Bioluminescence has been acknowledged by the H&SE in the UK as an acceptable method of measuring bacteria and other micro-organisms in water systems to help in the control of Legionnaires' Disease.

Analytical Water Testing

This is the most accurate form on bacterial testing. Using a UKAS or equivalent quality assured laboratory, samples should be taken by a competent trained person and submitted for analysis up to 12 hours after obtaining samples or up to 24 hours if refrigerated.

A normal suite would test for Coliforms, E-Coliforms, and Total Viable Count of bacteria per 100ml of sample at 22°C and 37°C.

Normal results would be as follows:-

Coliforms	0 (DW Regulations).
E-Coliforms	0 (DW Regulations).
TVC at 22°C	< 100 per ml = acceptable. < 200 per ml = undesirable, investigate. >200 per ml = not acceptable, remedy.
TVC at 37°C	< 10 per ml = acceptable. < 100 per ml = undesirable, investigate. > 200 per ml = not acceptable, remedy.

(Or increasing trend) TVC's are used as indicators of activity for guidance purposes.

SAMPLING FOR LEGIONELLA

Routine sampling to detect the presence of Legionellae in hot and cold water systems is not recommended. However regular sampling for Legionella is advocated on cooling systems, spa baths and some other systems or if a risk assessment indicates. Further information in HSE Document L8 2001 and HTM 04

A public health laboratory survey has shown that Legionellae can be found in most water systems. Wide discrepancies have been found when testing the same water sample for Legionellae due to the sampling and analytical procedures.

Total bacteria count cannot be used as a risk indicator for the presence of Legionellae. However, a sudden increase in counts over and above normal levels or a gradual increase over a period of time can be indicative of a deterioration in the general water hygiene.