THE WATER MANAGEMENT SOCIETY

Rapid Microbiology Industry Liaison Group

IMS (Legipid) Factsheet

These guides are intended to give unbiased views regarding a number of technologies and test kits and their potential capabilities.

The opinions expressed are the views of individual members of the Rapid Microbiology Industry Liaison Group and are supplied in good faith. Additional third party opinions are provided in the attached literature references and on-line links. The WMSoc cannot be held responsible for any misunderstanding or subsequent misapplication of this information.

The manufacturer should be contacted regarding details about availability, pricing, repairs, calibration, QA/QC recommended protocols, validation data, and performance data, etc.

The factsheets cannot give advice regarding specific water testing alert levels – these need to be advised by the regulators.

IMS (LEGIPID) SUMMARY TABLE

- IMS is a primary detection method i.e. it does not require a culture step.
- Samples require concentration as per ISO 11731
- Rapid testing time (approx 1 hour/ 20 tests)
- More specific and more sensitive than traditional culture methods
- Approximately 12% of positive results and 5% of negative results are false
- Doesn't differentiate between *L. pneumophila* or serogroups

Method	Immuno-Magnetic Separation
Bacteria detected	*Legionella* species
Pre-concentration as per ISO 11731	YES
Algorithm to convert results to CFU	YES
Can differentiate between live and dead cells	LIVE only
Will detect viable but non-cultureable (VBNC) bacteria	YES (reduced signal)
Interference from biocides and other water treatment additives	None reported
Use with complex water samples e.g. from cooling towers	YES
Laboratory or field	Manual procedure, better in laboratory (automation in development)
Are results comparable to current plate counts?	Yes (if photometer used)
Would current plate technique still be required?	No
False positive False negative	11.6% 4.7%
Could rapid test give a positive result whilst culture test gives negative result?	IMS detects VBNC and is not influenced by growth inhibitors (see 3ii).

Suitable verification data should be supplied by any laboratories undertaking the testing (or UKAS accreditation).
All tests should have positive and negative control data available - irrespective of whether laboratory or field-based.
N.B. Not all methods are suitable for field-based testing.

1.	General	
i.	Name of Test:	**LEGIPID**
ii.	Scientific principles / basis for test:	**Immuno-magnetic separation & enzyme immune-assay**
iii.	Sensitivity: Specificity: Limit of detection:	**95.3%** **88.4%** **Equivalent to culture**
iv.	Scientific publication references:	**Albalat *et al.* J. AOAC Int. 2014; 97(5):1403-1409** **Díaz-Flores *et al.* BMC Micro 2015;15:91**
v.	Patents:	**Yes**
vi.	Countries sold into:	**Worldwide**
vii.	Manufacturer: Supplier:	**www.biotica.es** **www.veras.eu**
viii.	Commercially available:	**Yes**
ix.	Micro-organism species detected:	***Legionella* spp**
x.	Lab based: Field based:	**Yes** **Requires pipetting skills**
xi.	Can the test be used to determine operational control? Trend analysis?	**Yes** **Yes, if photometer is used**
xii.	Independent end-user data:	**Yes**
xiii.	Method validated by third party:	**Yes (AOAC)**

2.	Application details	
i.	Sample quality required:	**Can be used with complex matrices such as cooling tower water**
ii.	What sample preparation on-site is required:	**None**
iii.	Does the sample need to be tested within a prescribed time scale (courier)?	**As per BS 7592**
iv.	Sample bottle type: Sample volume required:	**As per BS 7592**

3.	Analytical procedures	
i.	Does procedure require initial isolation of test organism by culture?	**No**
ii.	Which other substances and/or microorganisms are potential interferences or inhibitors?	**IMS is not a growth technique & is unaffected by growth inhibitors (interference by biocides or competing microorganisms)**
iii.	What additional equipment will be required?	**Refrigerator, optional agitator, pre-filtration equipment, optional photometer**
iv.	Is equipment specialised?	**No**
v.	Is the process automated? Could it be automated?	**Under development, currently in field beta test/validation** **Yes**
vi.	Does sample need pre-treatment prior to analysis?	**Yes – filtration or centrifugation (ISO 11731)**
vii.	Is training provided?	**Yes – bespoke on-site**
viii.	How long will test take before results are available?	**Approx. 1 hour**
ix.	How many samples can be analysed?	**Approx. 20/ hour (including controls) hands on time**
x.	What units are results expressed in?	**Visual semi - quantitative** **Colorimetric algorithm to CFU when using approved 3rd party photometer**
xi.	Does the result correlate with standard analytical procedures such as plating?	**Yes** **(Díaz-Flores *et al.* BMC Micro 2015;15:91)**
xii.	Is specialised training required to conduct test and interpret results?	**Yes**
xiii.	Are results reproducible:	**Yes**
xiv.	What errors (if any) could occur with analysis (weak link)?	**Failure to follow exactly method (supplied per pack)**
xv.	Has test been validated for environmental samples?	**Yes**
xvi.	Does the final result include VBNC?	**Yes (reduced signal)**
xvii.	Does it detect live or dead cells, or both?	**Live cells only**
xviii.	Has test been used in an EQA process or could it be?	**Yes**
xix.	Will it be possible for a user organisation to gain UKAS ISO 17025 accreditation?	**Yes**

Glossary:

Algorithms - can enable calculation between different measures (e.g. MPN to CFU)

Colony forming units - used to estimate the number of viable bacteria or fungal cells in a sample

Genus - a way of classifying bacteria. Genus comes above species & below family

Sensitivity - (also called the true positive rate or probability of detection) measures proportion of positives that are correctly identified as such

Species - a group of living things that all share common characteristics and that are all classified as alike in some manner

Specificity - (also called the true negative rate) measures proportion of negatives that are correctly identified as such

Strain - a particular variety of bacteria

Viable - the ability (of bacteria) to multiply

List of abbreviations:

ATP – Adenosine tri-phosphate

CFU – Colony Forming Units

EQA – External quality assurance

GU – Genomic unit

IMS – immunomagnetic separation

LOD - Limit of detection - the lowest quantity of bacteria that can be distinguished from the absence of that bacteria (a blank value) with a stated confidence level (generally 99%).

MPN - Most Probable Number

MALDI ToF – Matrix Assisted Laser Desorption/Ionization Time of Flight

NF Validation - Third party certification

PCR – Polymerase Chain Reaction

qPCR – Quantitive Polymerase Chain Reaction

RTPCR - Real Time Polymerase Chain Reaction

VBNC – Viable but Non-Culturable