

The Three 'R's of Automatic Wastewater Sampling

It must be acknowledged, when a company is setting up a processing factory or effluent treatment plant, the wastewater sampling end of the project is perhaps not the most glamorous part. Added to this, if automatic wastewater sampling equipment is being installed as a result of an instruction by the local Authority or Water Company, it can be viewed as more of a nuisance than something that will yield any benefits. This however is far from the case.

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It should also be said, that only by sampling, testing and therefore monitoring what is coming out of a plant can we really understand what is going on throughout the entire process. A good wastewater sampling system should give a company the confidence that it knows exactly what it is discharging; this will not only help verify that its effluent discharge bills are correct, but also provide 'real' effluent data which can potentially help 'fine tune' the processing operation itself. Additionally a well run sampling system will also provide surety to the company that, in the event of a discharge fine, it can demonstrate that it has a diligent approach to effluent monitoring and also offer evidence of this by means of the collected samples. As is often said 'without a sample, where is the proof?'

The need for wastewater sampling equipment is often established by the requirements of the Discharge Permit as issued and monitored by the relevant authority/water company. This will be established on the basis of the likely composition of the effluent being processed and the sensitivity of the watercourse into which the final discharge is being made. Ultimately, though, a sampling requirement will be described in terms of a required sample volume taken at a specific frequency (can be in terms of time, flow or other event) over a given period of time. In addition to this, sample segregation and the need for temperature control will be advised. These requirements can be translated into a specification against which Automatic Wastewater Sampler manufacturers can quote; generally the following product attributes will be established:

- Compliance Standard (such as UK MCERTS)
- Portable or Stationary
- Indoor or Outdoor
- Sample Refrigeration
- Sample Frost Protection
- Single Container (composite)
- Multi Containers (often discrete)

Undoubtedly, there are many benefits associated with automatic wastewater sampling. Instrumental to these benefits is the need for equipment which will provide samples that are:

- Representative of the source effluent and stored in conditions which minimise degradation whilst awaiting analysis
- Repeatable in terms of volume, extraction method and location
- Reliably extracted at a pre-defined frequency

We refer to these essentials as 'The Three R's'. At Aquamatic, our solution has been to develop a range of Samplers with a core, programmable module called the Aquacell module, designed around the Three R's, which extracts samples at a pre-defined schedule or in response to an external signal.



Aquacell S320H at a large food factory

A Representative Sample

There are two key elements to the collection of a representative sample – the way the sample is taken and the way that it is then stored. The sample must be removed from the effluent stream in such a way that the integrity of the liquid is maintained. Minimal 'work' should be put into the effluent during the sample extraction process and degradation of the collected samples whilst being stored within the sampling equipment should be minimised

The various manufacturers of Wastewater Samplers take different approaches to sample extraction. One very successful design is the air pump vacuum system, as used in the Aquacell range, this system will automatically purge itself between samples to avoid the risk of contamination between one sample and the next. It will then lift the sample from the effluent stream to the sampling module using a wide-bore pipe so that it doesn't compress or 'work' the sample at any stage, then discharge that sample into the sample container. This type of sampling system results in collected samples that are truly representative of the wastewater stream from which they came.

Once the sample has been removed from the effluent stream, it has to be stored in a suitable sample container. Sample collection vessel options range from the simplest Single Containers through to elaborate automatic self-emptying, self-cleaning bottling systems. Many are available in a wide variety of forms and materials including glass, HDPE or PET. Selection of the correct Sample Collection Vessel

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Wall mounted Aquacell S100 with large capacity container

can be critical where particular chemicals in the sample may react with the container material itself, and thus affect the integrity of the samples. Some manufacturers provide specialist options for these scenarios which further expands the product suitability to a wider range of aggressive sampling regimes.

A Repeatable Sample

One of the key requirements of any good sampling setup is that the Sampler operation is repeatable. We have read earlier how important it is that the sampler can extract a truly representative sample of effluent. It is also of course vital that every sample is extracted in the same manner, that there is no variability in volume or degradation of sample integrity during the extraction process. Of course, that in part will come down to good maintenance, but will also be determined by the design of the sampling system being used.

With a powerful effluent lifting system ensuring minimal 'drop out' during the intake phase and zero compression of the sample Intake Hose, a system such as the Aquacell Module ensures a repeatable sample both in terms of sample integrity and crucially sample volume. The volume measuring system built into every Aquacell Sampler is an empirical mechanism which ensures extremely accurate sample volume that is not prone to drift due to tube wear over prolonged periods of use.

A Reliable Sample

To be successful, an automatic wastewater sampler has to be able to operate unseen and often unattended for long periods of time, and yet when the sample is required for testing it

absolutely HAS to be available and measurable, if not the consequences can be severe. Obviously, regardless of the manufacturer, good housekeeping and a planned maintenance regime must be in place. However, a sampling system utilising open bore tubing which does not compress the effluent during intake (where hard solids such as stones can then lead to tube wear or even failure) can provide some significant benefits. Additionally there are performance standards set for automatic Samplers which will help a company select equipment with the confidence that it will comply to a specific performance level. Most notable in the UK is the:

- UK Environment Agencies MCERTS Standard for Continuous Water Monitoring System (CWMS) Part 1 – Automatic Wastewater Sampling Equipment

In many cases this standard is a mandatory requirement and as such has been achieved on various products from a number of Wastewater Sampler Manufacturers, in fact in Aquamatics case, compliance has been gained across the whole range.

Wastewater Samplers that follow the 'Three R's' should offer users high performance, simple operation and solid operating principles. These key product characteristics will help to make sure that the equipment provides representative, repeatable and reliable samples for many years to come.