



Chemical Dosing

Chemical dosing is the delivery of a chemical substance into foul water, sewage or sludge-like fluid, usually as part of preliminary processing. It is most often used on sewage treatment, as part of the anaerobic digestion process for making energy from waste and for cleaning industrial effluent to be returned to the natural water course. Here Philip Brown, Project Manager for pumping solutions at Verder UK, explains the process.



Chemical dosing is a crucial part of wastewater treatment for maintaining the quality of the natural watercourse in both utility and industrial processes

Industry Sectors

- Waste Water Treatment
- Clean Water
- Anaerobic Digestion
- Industrial Effluent
- Power Stations
- Mining
- Building services
- Public Infrastructure

The dosing process

A chemical dosing skid is the most effective way to dispense chemicals, using at least two peristaltic or metering pumps attached to pipe manifolds encased in a cabinet. One pump acts as a duty standby to ensure the dosing process is uninterrupted should a wearable component need to be serviced.

A chemical dosing system uses pumps to automatically control the dosing process. In the case of wastewater treatment works, there are certain environmental regulations in place from the water regulator, so when sewage enters the works, the effluent has to be filtered, cleaned and processed.

The effluent may contain toxic material which is passed through filter beds, leaving what is, in essence, dirty water that cannot be discharged into the water course; lest it kill off fish and other forms of aquatic life. This is enforced by the UK Environmental Agency, which will impose penalties on any water companies doing this.

Therefore, these water companies must dose certain chemicals to achieve a balanced pH level and remove impurities like phosphates, which would otherwise cause algae to grow in a stream, depriving fish of oxygen and affecting livestock drinking water.

pH buffering

Chemicals such as sodium hydroxide or lime are dosed in conjunction with pH measurement - a process known as pH buffering. The amount of buffering will vary according to the time of day; for example in the morning when people use the toilet or bathroom, or in the evening when they finish work. As a result, dosing pumps need to increase the amount delivered at these peak demand times and reduced during the hours of sleep, producing a diurnal, cyclical flow.

Water companies will typically work to a standard specification with approved framework suppliers for equipment, tanks, pipework, motors, electrical switchgear, cable and so on.

Verder has framework agreements with several water authorities such as Scottish Water for example, but can also operate outside these agreements where it can show a cost saving, quicker delivery or innovation. For example, Verder uses peristaltic pumps to handle lime which traditionally clogs up other types of pumps.

When a site encounters a problem which can't be resolved by the supplier, Verder steps in to provide a working solution. This could be when a pump has failed or become blocked, or where dosing has been inaccurate.

Verder UK Project Team

Verder supplies complete chemical dosing systems, individual components and service solutions from assessment, design, build and installation - focussed closely on meeting client requirements. The chemical dosing solutions are managed and installed by the Verder Project Team, including a project manager, engineers and support staff who have provided much needed services to water companies in the UK.

By using existing capital equipment on site, Verder can retrofit to and refurbish existing systems in situations where incumbent framework suppliers may only want to offer new systems delivering significant cost reductions.

One of several recent examples involved re-using two existing storage tanks and a kiosk. Following inspection only the pipe work and new dosing pumps were fitted, whereas the rival offer required fitting new tanks and kiosk.

Verder engineers have all the current mechanical and electrical qualifications that are relevant, including the health

and safety cards required by every water authority, and overseen by trained site safety supervisors with additional qualifications.

Verder conducts site surveys, produces the risk and method assessments, and performs all the groundwork, modelling everything in 3D computer aided design (CAD) software showing pipework, cabinets and pumps.

Before the system is installed on-site, all these components are first tested at Verder's Service Centre. For example, one recent application involved building a cabinet at the Verder premises before shipping it to Thames Water in Crawley, West Sussex. There, it was swiftly secured, connected to pipework and had a kiosk dropped over it to house the contents.

Removing Phosphates

Introduction of an iron-based chemical solution like ferrous or ferric sulphate or chloride is needed to remove phosphates.

Alternatively ferrous sulphate can take the form of copperas crystal, a by-product of the pigment industry, which can be mixed in a tank with water in a unique patented process available from Verder in conjunction with Naiad Aquatic Water Services.

Working in conjunction exclusively with Verder UK, Naiad Aquatic Water Services, has developed a range of chemical dosing systems including the Naiad Copperas Saturator. The latter was developed in partnership with Thames Water's R&D section to provide a cost-effective alternative to liquid dosing.

Naiad chemical dosing systems incorporate feed-back and load profile control options and enable process optimisation for phosphate removal and septicity control. When used to dose chemical to sewage for phosphate removal, phosphate residuals in final

effluent consistently meet targets, and odours are minimised.

Verder takes pride in delivering pumping solutions that are designed around the needs of the customer, not off-the-shelf packages which are made-to-fit all.

Customer feedback regularly shows that the quality and robust nature of the end product and how the project team conducted itself on-site and in consultation are viewed as key benefits.

Verder operates an 'open door' policy to customers, from the initial contract bid, through to the first phone call for spares or contract maintenance.

Verder is there every step of the way, acting as a one-stop shop but without taking the customer for granted, and rewarding them with highly competitive rates and priority service.

Verder works with engineers in meetings to discuss their requirements, whether the setting is in a boardroom or on-site in boiler suits, presenting a professional attitude combined with courtesy and respect.

Ultimately, Verder aims to save water utilities as much money as possible while providing them with more reliable and robust equipment. The

key is avoiding hidden costs having to be added at the end of a project, whilst keeping the customer in the communication loop from start to finish.

If you would like to contact the Verder UK Project Team about your requirements for chemical dosing

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In focus: Dosing at Thames Water Crawley STW

Following the successful operation of an initial Verder system, the Verder UK Team provided a replacement dosing system for phosphate removal.

The system uses Verderflex Dura pumps for the delivery of the chemical. Verder UK provided Package Dosing Plant consisting of control panel, dosing rig, pipework, valves, dosing hoses and kiosk assembled and tested at the Verder Service Centre.

The Verder UK Team commissioned the system and gave training to the Thames Water maintenance engineers and supplied a spares and maintenance plan.



In focus: Dosing at Kilroot Power Station, Northern Ireland

The Kilroot Power Station which serves Belfast required a dosing solution for the corrosive cooling water, heavy in salts which was attacking the filter screens and pipe channels. The dosing solution had to be a single turnkey package which could handle chemical in a crystal or liquid state, a mixing tank and pump rig.

The Verder UK team built a bespoke system to accommodate these requirements. The system was compact, easily installed, robust and allowed the simple deposit of crystal chemical via a chute.

The chemical was dosed to the cooling water to neutralise the corrosive salt contained within the water and to leave a sacrificial coating on the network of tubes and screens.

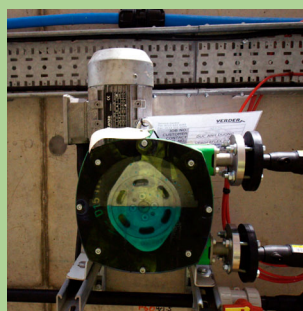


In focus: Dosing in Anaerobic Digestion, Norfolk

The production of energy from waste is one of the important process requirements in the renewables sector.

The Verder UK Team have provided pumping solutions not only to the handling of waste food slurries, they have also provided the dosing solution to create the optimal conditions for the anaerobic digestion process.

The Verderflex Dura pump doses enzyme to regulate the slurry mixture. The dosed slurry is then circulated through a bank of Verderflex VF Industrial pumps distributing the solution and recirculating like a cow's stomach.



In focus: Dosing and circulation of lime at Severn Trent Barston STW



The initial installation required a solution to circulate lime mixture in the tank. Verder UK installed a Verderflex pump to keep the lime slurry blend mixed to the required state. This unit was specifically chosen due to the performance level the Verderflex pump could provide to circulate the fluid from the base to the top of the tank. The suction properties of the Verderflex ensured there were no dead spots in the base of the tank and the working principle guaranteed there were no blockages and a long MTBF.

The homogenous state of the mixture meant less lime chemical settled in the tank and a consistent fluid was being delivered by the dosing system.



The pump was in fact such a success that the Verder UK team won the bid to provide a chemical dosing skid for sewage treatment.

This system incorporated a cabinet with Verderflex Dura peristaltic pumps (1 duty standby). The system is piped to a tank and controlled by a pH meter and inverter to raise/lower the delivery of the dosage depending on the demand or volume of sewage. An emergency shower was also installed.



The Verder UK team provided consultation to the Severn Trent Team, a full drawing service, assembly and testing at the Verder Service Centre, on-site installation and commissioning, contract maintenance and spares requirements.

Further site references

Harlow Hill

A series of Verderflex peristaltic pumps were installed for the use lime dosing to regulate the pH levels following the removal of phosphates.

The installation was controlled through a pH monitor determining the speed of the pumps via an inverter to maintain a stable pH.

The Verderflex pumps were chosen due to their ability to handle abrasive lime slurry as well as our experience on similar sites. The Verder UK team provided the consultation for the pump specification, pump supply and spares.



Roundhill

The Roundhill site contains multiple skid units capable of pumping both liquid and crystal chemical. The Verder UK Team provided the design, build and installation of the skid units, the kiosk housing and pipework (including underground pipes). The system was praised for its high standard of finish, particularly with the contained pipework runs underneath the units.

The control unit was also supplied; built specifically to the requirements of the customer.



Rymeads

The Rymeads site contained several skids capable of dosing copperas chemical in either liquid or crystal format. To accommodate this an easy-drop unloading port was constructed for tanker or truck unloading.

All the dosing skids were assembled using Verderflex peristaltic pumps in our Service Centre. The Verder UK Team provided the skids.



What makes our Dosing Systems unique?

A Verder UK Dosing System is created around the customer's requirements. Our systems built as a modular package from a range of options such as pump type, duty requirements etc. This means not only is the customer's requirement met, but also is the most cost-effective providing only the functionality you need, often being able to retro-fit or recover equipment with a useful working life.

The patented dual-delivery system allows both liquid and crystal chemical to be pumped. The benefit means a customer can buy the most cost-effective chemical solution, lowering the operational costs over the life of the system as well as reducing the site's carbon footprint through fewer truck deliveries.

Working in partnership with Naiad Aquatic Environmental Services Ltd combines the latest scientific knowledge and engineering excellence to create the perfect dosing system for any site.

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