



## From Pump to Pipe

### Maximizing Metering Potential

The traditional “pump-on-a-tank” metering pump philosophy at municipal treatment facilities has diminished in favour of complete package systems that arrive on site factory assembled and shop tested, ready for contractor installation. The metering pump system is an integral part of any treatment process and maximizing its potential relies on a good understanding of the metering pump technology, the accompanying appurtenances and the long term planning for safe and reliable operation.

Successful metering starts with the pump itself. There are several positive displacement pump technologies employed in the municipal industry, including: diaphragm, peristaltic, gear & progressive cavity. In order to select the proper technology, the system designer must clearly identify variables such as chemical properties, suction/discharge line conditions, dosage and consumption rates, control strategy, and operation frequency.

There are trends towards using particular positive displacement pump technologies for certain applications, however, no two sites are identical and each application needs to be designed accordingly. If the chemical has off-gassing principles, a self priming pump might overcome airlocking issues. Maybe clogging or viscosity would potentially cause fouling and a pump without check valves might be ideal. Or maybe the system does not run continually (a rechlorination station, for example) requiring the designer to evaluate the entire control strategy and how the metering pump can be optimized to operate when it is called upon.

Once the metering pump has been chosen, the system design can be further expanded to incorporate all of the appurtenances that will deliver chemical to the injection point accurately, consistently, reliably and safely. It is very advantageous to have the metering pump supplier also supply the accessories on a factory assembled panel or free standing skid. The consultant can sort out



## Maximizing Metering Potential cont'd....

any orientation and footprint factors before equipment shows up on site. Installation is simplified for the contractor as they only have to hook up the tank connections, run piping to the injection point, and bring power to the system. And, most importantly, the operator has a sole source manufacturer for training and future service.

Typical accessories that are supplied with the factory assembled metering pump system: back pressure sustaining valves; calibration columns; flow monitoring devices; local control modules; and pressure relief valves. The need for each component should be evaluated on a site-by-site basis.

Accurate and consistent pumping can be impacted by changing conditions on the discharge line. The altering of back pressure at the point of injection due to system changes can lead to inconsistent pumping. After the pumps have been properly adjusted using the calibration column, the back pressure sustaining valve is designed to alleviate back pressure problems. By maintaining a pre-set back pressure (typically 10psi over the injection pressure), the pump performs consistently according to its calibrated values. It is typically mounted on the package system, however, it is sometimes recommended to install it closer to the point of injection if there are siphoning concerns (open channels and reservoirs).

The reliability and integrity of the system can be continually assessed in a few different ways, the most direct being a flow monitoring device on the discharge line. Some manufacturers integrate monitors into the electronics of the pump while others rely on external devices (switches, flowmeters) and plant PLC integration. Regardless, the flow monitoring device should be capable of giving the operator a pump failure feedback in order to address issues in a timely fashion and keep the plant operating.

For systems that are critical, the design often calls for a hot standby pump ready to go when the duty pump fails. The flow monitor and local pump alarm that is provided on many pumps can be used to perform an automatic switchover locally or remotely. A simple way to do this is with a manufacturer supplied local control box that

can perform switchover functions at the pumps or by interfacing with a plant's SCADA system.

Finally, providing a system that promotes operator safety should be a heavy consideration during the design of any chemical feed system. There are several practical design considerations that should be made when keeping system and operator protection in mind. For instance, adding a pressure relief valve on the discharge solution line is an obvious necessity. Typically set at about 30psi over the system pressure, they protect against over pressurization of the system which may happen due to line blockages or failure to open isolation valves.

Assessment of piping materials and handling procedures is another factor to be considered when designing a system. Knowing chemical properties and tendencies is crucial to proper design. Sodium hypochlorite applications are a case in point. They are notorious for creating site problems from a safety and aesthetic stand point. Often, with PVC piping installations, the chemical finds its way through the fitting connections and causes leaks. For PVC, it is imperative that the supplier is using the proper beveling techniques, drying procedures, and connection glues.

What about examining the piping materials? PVC pipes, valves and fittings have been traditionally accepted as a standard for sodium hypochlorite applications but there are alternatives being used that improve system longevity and ultimate operator safety. Nowadays, flared Teflon tubing is being used frequently because of the ease of use in manufacturing and servicing, as well as the long term protection against leaks. Facilities are able to justify the higher capital cost versus PVC because of the long term maintenance savings and ease of operation.

Another example of proactive design is the examination of injection point conditions. Quite often the chemical is injected into the process using a corporation stop. It seems simple enough, but the system designer must keep in mind that eventually the operator will have to service this apparatus. For applications where calcification can clog up the injection lance, it is especially important to make the corporation stop accessible for cleaning. If shutting down the system is not ideal, there are easy cleaning corporation stops on the market that allow simple in-situ cleaning of the lance.

Maximizing your liquid metering potential relies on all of the components working together as a well tuned machine. Your chemical feed supplier should be attuned to these demands so that you can have a long and happy relationship with your metering pump system.