ODS Specialist in Milieu-Instrumentatie

ODS BV Barendrecht

The features of in-line Waste Water Sampling and in-line Flow Measurements

Water quality by sampling:

For the determination of effluent costs we use in Holland a quit different regulation then in most other European countries. Our Government worked together with some comities and engineering companies and decided that a good determination of the effluent cost could be made via: Accurate measurements and laboratory analyses of a representative sample. It is now all stated in the NEN-6600-1 and NEN-6600-2.

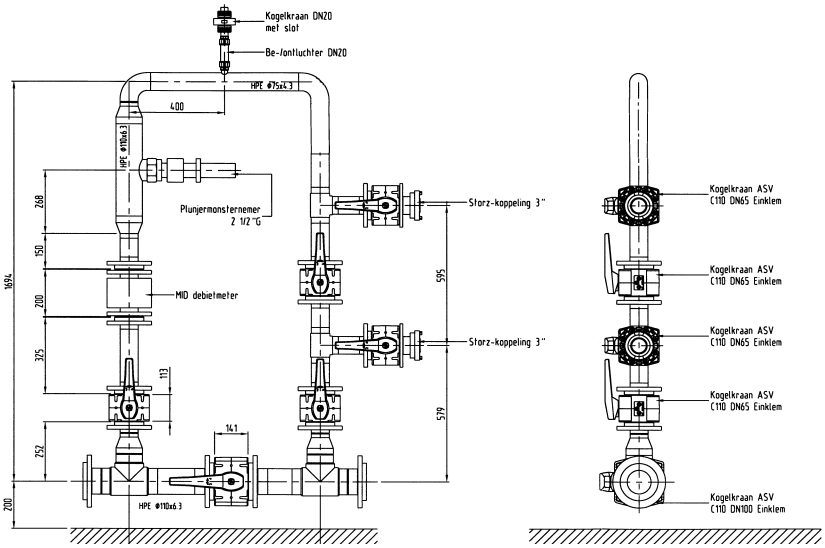
Accurate of flow measurements:

As most effluent systems have a wide range of flow (dry whether / rainy whether) it is very hard to measure accurate. In the past we used venturies and V-notches but slowly they are replaced, mostly by EMF's (Electromagnetic Flowmeter).
An EMF is accurate when the velocity is > 0,3 m/s (Reynolds). Furthermore the speed should be high enough to clean the EMF from sedimentation and contamination. So the regulation state that it is allowed to use an EMF as long as it measures less then 5% of the total time in the measuring range lower then 10% of the range.
When using a EMF in a gravimetrical situation and filled all the time (we call this a cow horn) the maximum velocity is about 2,5 to 3 m/s. With a higher velocity the dP over the measuring system gets unpractical high. In many cases this measuring method is not achievable.

A second demand of the NEN6600-1 is that the flowmeter should be cleaned and checked yearly (they call it a dry calibration) and calibrated every 3 years. Calibration should be done with the meter in the built in situation!!!! How to do that? They use pump systems and EMF's te verify the DUT (device under test – our EMF) against a secondary standard calibrated external EMF. Particle doable up to DN 250. A more and more used method is to use pump systems.
The free floating water is collected in a basin with a large buffer. A 2-pumps system, on/off or frequency regulated, is used to pump the water up, through a loop with a EMF. If the pomp is off, no measurement takes place. If the pump is on, the velocity is high and the measurement is accurate. In the loop you will also find some valves for connecting a secondary standard calibrated external EMF.

Representative sampling:

In the old day's vacuum sampling was the only option. The tube should be positioned in the water system on a location where the water was always turbulent. Nevertheless experiences with parallel sampling showed that even then, in some cases, the spread in the water composition can be > 50%. (COD, Nkjeldahl, etc.). This all has to do with iso-kinetic effects (direction of flow, velocity of flow, direction of the tube, velocity in the tube). Also the water velocity was very variable due to dry weather and rainy weather. Polluted water (food industry) resulted in heavy particles with high organic load either flowing close to the bottom of the pipe or on the surface. As the collected day sample should contain at least 100 samples of at 50 ml (5 litres per day at dry weather) the sampler should be pretty fast and the vessel/container should be pretty big (60 litres). A vacuum sampler is not that fast. A cycle time > 1 minute is common practice. Again the NEN-6600-1 makes clear that it is better to use pump systems. At the outlet of the pump, in the loop, an in-line plunger sampler is mounted. The plunger will be activated via a controller that gets flow pulses from the EMF. So the sampling always take place in a turbulent water flow in a completely filled pipe. In-line samplers are fast. A cycle time of 10 seconds is doable.



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