



APPLICATION REPORT Water & Wastewater

Checking the energy production of a sewage treatment plant

- Measurement of energy transport from digestion tower to biogas plant
- Vortex flow measurement of methane at 7 to 8 mbar / 0.10 to 0.11 psi of pressure
- Superior measurement stability despite descending pipeline and fluctuating parameters



1. Background

The Burghausen public utility company operates a sewage plant including sewage treatment plant and connected combined heat and power plant fuelled by digester gas (methane). To this end, the sewage sludge is transported from the sewage treatment plant to the digestion tower where the residual solids are partially decomposed by microorganisms. The methane released in the process is then supplied to the biogas plant as an energy source.



Gas inlet with first water separator

2. Measurement requirements

To obtain accurate information about the energy production of the sewage treatment plant the operator requires continuous measurements of the volume and energy flow of the methane being transported from the digestion tower to the combined heat and power plant. Despite two water separators installed in the pipeline, the exhaust gas is still very wet. The pressure of the gas was initially very low at 65 mbar / 0.94 psi and decreased over time to 20 mbar / 0.29 psi and then to an average of just 7-8 mbar / 0.10-0.11 psi with the installation of a low pressure system. Despite the insulation in the digestion tower, the gas is exposed to external influences such as seasonal temperature fluctuations, which then affect the gas density (0.717 kg/m³i.N. / 1.565 lbs/scf). The operator of the sewage treatment plant had already tried using a differential pressure device but stopped using it due to faulty measurements. Based on this experience he was very skeptical about finding a measuring principle that would work with the existing parameters.



Flow measurement of methane gas at 7 mbar / 0.10 psi



3. KROHNE solution

KROHNE provided the OPTISWIRL 4070 C vortex flowmeter – initially as a test device – in the recommended size of DN25 / 1". To accommodate, the pipeline had to be reduced to DN25 / 1" from the original DN50 / 2". The device was installed as per customer request with a flange connection in a descending pipeline. The necessary inlet and outlet runs were provided.

The vortex device measures the operating pressure, temperature and volume flow and then automatically calculates the mass and energy flow of the methane gas based on those measurements. As the instrument also features a shut-off valve, its pressure sensor can be replaced if necessary, even during operation and without process intervention.



OPTISWIRL 4070 C in descending pipeline

4. Customer benefits

With the OPTISWIRL, the operator of the Burghausen sewage plant can accurately test and demonstrate the performance and energy production of his sewage treatment plant. In so doing he benefits from the OPTISWIRL's large span. Even though the system pressure following the conversion decreases to 7 mbar / 0.10 psi or even lower and the gas is extremely wet, the device still measures continuously and provides accurate measuring results.

Given the measuring parameters, the customer was surprised by the measuring performance of the OPTISWIRL and made the decision to purchase the instrument. The OPTISWIRL has now been running without interruption for over three years and without any maintenance requirements. The vortex device in the sewage plant has measured over 620,000 m³ / 21,891,171 f³ of digester gas to date.

5. Product used

OPTISWIRL 4070 Vortex flowmeter

- 2-wire device with integrated pressure and temperature compensation and conversion into energy
- Non-wearing, fully-welded stainless steel construction
- Suitable for wet gases
- High resistance to corrosion, pressure and temperature
- High measuring accuracy and long-term stability
- Immediately ready to use thanks to plug & play



Contact

Would you like further information about these or other applications?
Do you require technical advice for your application?
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